

JOURNAL
OF
THE MILITARY SERVICE INSTITUTION
OF THE
UNITED STATES.

"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

VOL. XX.

MAY, 1897.

NO. LXXXVII.

First Honorable Mention.

THE PROPER MILITARY INSTRUCTION FOR OUR
OFFICERS; THE METHOD TO BE EMPLOYED;
ITS SCOPE AND FULL DEVELOPMENT.*

BY FIRST-LIEUT. R. G. HILL, 20TH U. S. INFANTRY.

"Complaining profiteth little;
telling the truth may profit."

CARLISLE.

THIS is a timely subject. It is one to which officers can well give their best thought; it is one to be sincere about and to say of it what we think, and through an interchange of opinion those who are really in earnest can at least come to a general conclusion as to what is best.

The subject is one to be approached reasonably and not dogmatically. We should solve it on its own merits, on the material we have in our body of officers, on their mental and other qualifications, on the qualities and acquirements necessary to encourage and develop in them, on their relations to the people of our country, on what we in this country have to do with, and accomplish, and not what some other country has. Of course we want to know what other armies are doing, and that is a valuable guide if we do not become mere imitators. Let us imitate their essen-

* Essay completed August 20, 1896.

tial results, relying on our conditions and not attempt to misapply methods which have no meaning with us.

We want a system which will tend to encourage, with breadth of mind, a knowledge of professional detail, which will help in creating practical soldiers and educated gentlemen, not fussy theorists nor military pedants. We want substantial practical knowledge, and as much cultivation beyond that as officers may take unto themselves. The system cannot make the men, but it can furnish them the opportunity for making themselves. We do not wish a system which shall attempt to cast all in the same mould, but which shall have some uniformity in giving to all the knowledge of practical detail an American officer should have and at the same time not rob him of opportunity for as high development as he can attain.

While there are without doubt certain changes which can come about only through legislation, which would increase the efficiency of the line of the army, the writer proposes to deal with this subject first on existing conditions, and then endeavor to show how the question would be affected by certain changes. It is further proposed to limit the discussion mostly to the question of our line officers.

The subject is a timely one now on account of the concentration of our troops at larger posts. But let us not plume ourselves on being so much better off. Unless something else is made of the advantage than is being now made of it at most posts we will probably suffer by the change. I mean just this, that the younger officer of to-day has less valuable experience than formerly, when he was thrown into all sorts of positions of responsibility, such as the various staff positions at a post, more frequent command of his company, if not for administration at least at drill, much detachment duty when he learned to act for himself and look out for his men, to find his way about—very often having actual Indian fighting, and in any event responsibility. There were many things about the old conditions which had their drawbacks. Too protracted and continuous an experience without much study to keep in contact with modern military methods tended perhaps to develop more the qualities of the mounted policeman than of the educated soldier, but it did develop self-reliance and the habit of thinking for one's self. It was the school in which Grant, Sherman, Sheridan, especially the latter, and most of the successful generals on both sides during

the Civil War spent much of their early manhood. In some ways it is going to be difficult to replace it by any system we can introduce at our large posts. While it is probably not true at all of our posts, I believe it is at most that the only direction in which they have attained increased proficiency is in that of close order drill, and to some but by no means a uniform extent in field and battle exercises, where the men are really taught less of value than they were in actual field duty on the frontier. We have our examinations for promotion, but officers were studying before that was brought about. Indeed, I cannot see that young officers are studying harder than they were ten or fifteen years ago. There is however, without doubt, more study in the army now than then in all grades. We have our lyceums, where many good (and bad) ideas are put forth, and find in the summer that even when the opportunity exists the ideas are not put in practice. We have recitations, a school in which no one ever becomes proficient. The subjects on which we are examined for promotion are well selected. A thorough practical knowledge of these subjects, with some other practical work, would develop the quality of officers, generally, perhaps as much as it can be developed by a system which must have certain limits and not attempt too much. There are many subjects on which a theoretical knowledge alone is of little value. We are apt to see such knowledge in certain directions actually placed above the ability for work in the same field, and the latter treated as a matter of little value compared to the ability to talk or write of it. Our whole system is running us too much into theoretical knowledge. I do not wish to be understood as decrying theoretical studies. One must study, read and think much, if his judgment is to become ripened. Sound theory and successful practice are constantly reciprocal in their operation. It is by means of a deep basis in theory that an intellectual man passes in a shorter time to successful practice, and because of this basis he is equipped to meet contingencies which upset the mere rule-of-thumb man. But there is a vast difference between the acquirement of sound theoretical knowledge through study and thought and subsequent application, and the obtaining through memory alone of a mass of stuff called knowledge. What we know as the purely theoretical man is the one who *seems* to know a great deal but can never do anything well; and the real difference between such a man and the purely practical one is that the former gets everything he knows from books, lets

those who have gone before do all his thinking for him, while the latter rejects past experience and must think out everything for himself. The former is dangerous because a fictitious value is often placed on him; the latter is apt soon to find his limitations, but within them he is usually valuable. His power of thought, of planning his efforts, is altogether more to be desired than the mere copying of the other. It is clear thought that should be wanted everywhere; it is the thing which has raised us and keeps us above the condition of the savage. We want above all things in our officers the qualities of thinking, of planning and devising, we want ready men with as much real knowledge as they can stand but without too much erudition.

It is thought and activity which produce both great and small results. It is the unthinking man, whatever his degree, whatever his technical knowledge of certain things, who flounders about in all he undertakes; he sees not the object it is necessary for him to accomplish and devises not the means for its successful termination. Because he uses many means good enough in themselves—for he learned them from some one who could think—yet wholly misapplied, he still maintains a reputation of some sort and continues misdirecting to the end. We often hear the remark "Yes, so and so has good executive ability, but does not know much." As a rule he knows more than is always appearing on the surface and knows very much in being able to use the head placed on his shoulders—not merely as a thing to be stuffed at random with the contents of books, but as an organ to be put to work on whatever matter it is charged with managing. I repeat that I am not arguing against hard study. He is not the best man who does not find resource in books—it may be his principal one without injury. It is the slavish dependence on them and on the thought of others which destroys the intellectual strength of men. There is not really too much theoretical knowledge required of our officers—the point is that it is not coupled sufficiently with the practical, and the danger is of officers losing sight of or never learning the real value of what is studied. It is rather a remarkable thing that in our service we are receiving according to a prescribed method practical instruction in Signalling and First Aid, while the three subjects of tactics, of field engineering and topography are practically neglected. The subjects taught are useful, but most military men will probably agree with me that the others are more valuable to a line officer. One might indulge in

the shrewd guess that we have a signal and medical corps, both organized and desirous of helping us out in our work and creating as many assistants as possible. Our engineer corps has been engaged mostly on civil works—doing it all well and creditably, and has not shown the enthusiasm of the other corps in spreading knowledge. Our tactical department, is presumably ourselves,—the line. Therefore I am silent, at least here where the other departments are in question. I do not think we need the fatherly superintendence of any of the staff corps to obtain what we need in our profession. In first aid the lectures by the surgeons have certainly been interesting and instructive and it is the best source for our knowledge. In other matters we can well take care of ourselves. But we must be about it, or the various staff departments will have the whole army at work on their special lines and crowd out more and more the military features. The substantial knowledge among our officers of military and other law is the best example of the value of practical *versus* theoretical training. Our officers have much real law work thrown on them as members of courts, judge advocates and counsels and the result is that the practical work gives them something of an insight into the beauty of the law and a large number go on way beyond what is required of them, and become really well versed, not perhaps through an ambition for the Judge Advocate's corps, but as an intellectual satisfaction. As a fact it is not the officers well read in the law who make the most petty points in practice, and I would not diminish the reading of law among officers, but rather increase it among intelligent men of all conditions, as no study tends more to broaden the mind, to cultivate a high sense of justice, a love of order and respect for authority, and for American and English institutions, which means patriotism and pride in our race. It is essentially one of the practical details of our profession, and a most important portion of a gentleman's education. If officers could be attracted by more practical work into other essential details the same amount of ability would go into them.

Much military work in time of peace must be largely theoretical, but it can be carried on with some logic. Everything we have should be as practical as it can be made with the means at our disposal, and unless one endeavors to reduce all purely military studies to something like a practical basis, to a thinking instead of a mere book knowledge basis, he would do better to

throw his books aside, get a stick and try to whittle that at least into some sort of shape. It is a truly serious question in this army of ours to-day, the one of practice *vs.* theory, and one to which those responsible may well look at earnestly unless they want our officers to bud into a corps of pedants instead of ready capable men in their profession. It will grow worse instead of better if decided means are not taken to correct it. We should not have mere pedantic knowledge on a subject placed ahead of real ability of accomplishment. It is always much easier to learn a few things about a subject and impress people by talking of it in set phrases than to really grasp it so that it can be used. The difference between the two sorts of knowledge is important. If one really obtains a thorough knowledge of anything it is always a part of him, he can lay his hands on it at short notice without keeping it constantly in his mind. This knowledge can never be obtained wholly from books. It may come largely through them, but in all fields there must be either practical work or careful thought. Once well obtained many practical matters in our profession can be thrown aside and resumed when needed. Everyone who has become once thoroughly familiar with drill, knows that he can leave it for four years and resume it without difficulty in a few days. It is the same with many other things after proficiency is once well attained—the subject not merely dabbled with, but once learned with thoroughness. These matters do not have to be bothered with at all times, and there is abundant opportunity for studying more difficult matters in the profession, and also for obtaining general cultivation. Indeed it is probably better for an officer not to yield himself too entirely to strictly professional study, but to find resource largely in general reading. One can soon become a narrow dry bones by never going outside of purely military matters.

There is a danger of going into too much work, too much with the means at our disposal, and so much that officers will be prevented from developing strongly in intellectual directions. There is a fair limit to place on the attempt to develop matured men by mere order, by prescribing what they shall or shall not study. Beyond a certain point it is positively harmful to enforce too much instruction. Those who can make use of it will get it whatever system is prescribed, and will be hampered by being compelled to follow on too rigid lines. Those on whom instruction is forced, beyond a reasonable point, will not retain it, and

they and others will obtain a false idea as to their knowledge merely because they have been put through a course.

On the part of some there is a tendency to copy blindly from the armies of Europe, and especially of Germany. We can learn from them, learn much, but do not have to copy. There is no greater admirer of the Prussian system for obtaining a great army than the writer. No one who has watched it at work, who has read of its exploits and visited some of the fields where it has won undying glory can but be impressed by its efficiency as a fighting force; cannot wonder that the scions of its noblest houses are willing to go out as file closers in that splendid host. It is the finest result that has been obtained, so far as history tells us, in the matter of utilizing what is best in a great body of men. The German army is the heart of the German people. The mission of the German officer is two-fold,—in time of peace to train the youth of the country to the profession of arms; in time of war to lead those trained men to battle. These objects are fulfilled in the most direct and practical manner. The youth are placed under their entire control for two or three years, each year about 70 recruits are taken into an infantry company and the same number go into the active reserve. In case of war the place of each officer and man is known—the several parts are immediately fitted together and the great engine goes to work. In our army an average of about 14 new men* come into a company each year, and the same number goes out by discharge, retirement, etc. Our system of recruiting during peace is not going to be changed materially. No one expects or cares to see the continental method of conscription introduced in this country. We do not want it nor need it, and should not try to imagine that our 25,000 men *and officers* are to be expected to fulfill their mission in exactly the same way as the great armies of Europe.

If we are to imitate the German system, let us imitate its essential features, viz.: that their officers' duty is to instruct the youth of the land in the profession of arms and to qualify themselves to be the leaders of the trained men in time of war. The latter has frequently been the mission of our Regular officer in the past, and the former is becoming the view more and more as our officers have been relieved from scattered frontier service, and are being placed on college duty.

Before taking up for consideration in detail a scheme of in-

* Computed from Adj't Gen's Rep. 1895.

struction let us look fairly at the material we have to work on. The officers coming into the army to-day are mostly from West Point, and those from the ranks who pass a quite rigid examination. As most appointments are from the Academy, they are to be chiefly considered in a comprehensive scheme. Many of the non-graduates will doubtless excel many of the graduates; in individual instances they may stand preëminent among their contemporaries. While we have much material among those who have come in from the ranks and from civil life since the war which could not have stood up under the present examination for entrance, it is fair to say that the personnel consists mostly of picked men. The weeding-out process has been pretty thorough before they were allowed to enter. Because a few have little in them it is not a guide for viewing the entire body. Many show less than they really possess through the inability of the present system to develop quiet, unaggressive men. It must be remembered that only one in between two and three who go to West Point for entrance succeed in graduating. There is a foundation laid there, and those who join in other ways have shown enough pluck to make the prospects for the future of our small army a brilliant one, if some comprehensive and intelligent system of instruction can be found and adopted. Even with the system under which we exist to-day—there are enough among our body of officers who will work on good lines in spite of it.

Beside their intelligence there are some other important qualities existing among our officers: As a rule, there is courtesy, a high sense of honor and of duty, a love of country, a respect for authority. We are not a body of saints by any means, but it is not the minor faults of men so much as their lack of distinguishing virtues which is a fair basis for estimation. There are, without doubt, some which our profession and any other could well do without, but the military virtues strongly pervade our army. They go to the foundation of all that is good in an army and could not be replaced by the finest system of instruction.

There is yet another important fact to be considered in the treatment of this subject of instruction; it is of the highest importance. We are a nation of about 70,000,000 people, with a small army. We are immensely wealthy, and while we have been engaged mostly on the arts of peace, and military knowledge is not widely disseminated, the indications of the past year show

that the people are as little averse to war as any on earth. If this means anything to us it must mean that upon each of us devolves a higher duty than though we belonged to a large trained army more in proportion to our population, wealth, and firm attitude in foreign relations. This view of the mission of officers in case of a large war is one entirely sustained by our history. We must bear to the large forces raised at any time in this country somewhat the same relation that the general staff does to the large European armies. The chances are more in favor of our needing a knowledge of all the arms, than the line officers in Europe. We have no real military staff corps in our army. None of the corps, the Adjutant General's, inspectors or engineers receive the training of staff officers. We certainly do not want more staff. In fact it is wholly doubtful whether a general staff corps could be well organized in our small army in peace and with any degree of safety be given the power of the general staff in Europe. In the first place our military has less control over its own appointments; in the second, a corps now organized would, if built up solely on supposed merit, even most conscientiously, rest on too theoretical a basis. In fact, we would find it difficult to create or use a permanent general staff in our army. It is better to give line officers opportunity for acquiring all-around accomplishments in the profession, make them *in addition to what they are now*, good tacticians and at least fair military engineers and topographers, and practical, not theoretical ones. Cultivation in an eye for ground, ability to seize readily a tactical question, quick judgment in the field, and knowledge of the many practical details of military engineering, how to make gabions, fascines, etc., throw bridges, select trace for intrenchments, handle working parties, etc. How to read and make maps and conduct reconnaissance. It is in these and other all-around accomplishments, not superficially acquired, that the regular officers can make themselves felt in the raw levies, whether on the staff or in command of regiments or higher organizations. By knowing these details, so useful for his own military training, he can find out and utilize talent in the volunteers. We hear it said that we want to teach men to be good company officers and not colonels and general officers. The first is admitted, but if, in addition, every lieutenant in our army could, after a few years, also be fitted to command a regiment or something higher, the mission of our army would be constantly fulfilled. All but a few

will be colonels before they retire and many may reach higher grades. The best way to fit our officers to be either good lieutenants, colonels, or generals, is to give them opportunities for practical development in all the details of the profession. There is probably less difference than we sometimes think between the ability to command well a patrol or an army. The only estimate in any case is by the success obtained and the amount of judgment, energy and sincerity thrown into the work. It is surely more honorable to do either well than the other badly.

While taking the broader view of the duties of our officers we must not lose sight of the fact that our army is still liable to be called out to take care of the Indians, and that it will be used more or less to prevent or suppress disorders sometimes accompanying great strikes. No one can say that these duties have not as a rule been well performed. The case may arise of the Regular army being filled up and going out as a body by itself without the assistance of volunteer regiments, but if a serious war occurs the Regular army will be but a small part of the entire force.

Besides prospective duties in war, there is one great duty in peace—that of instructing the youth of our land in military matters. Some of this duty is performed directly with our troops as with the large standing armies of Europe, but as shown, the number reached is comparatively small; some is performed in connection with the National Guard, but this can be largely only supervisory, as our connection is not sufficiently intimate to enable us to be instructors in the real sense of the word. The remainder is performed in connection with our colleges. In some respects it is the most important duty we can have devolve on us in peace. Sound and thorough instruction there means much. It is instruction given to men of education, the class of men from which when fitted otherwise, the officers of volunteer forces will be selected, men who may in the meantime become officers of the National Guard. As these boys go immediately from this instruction into civil pursuits, it should be highly practical and have little to do with text-books. They will throw these aside with their other books on leaving school. Things which they are actually required to do will be remembered. Therefore officers should be well prepared to give this instruction, to make it forcible and interesting from their own fund of knowledge and experience. The subject of college duty is referred to again further on.

There is not space here to set forth systems of instruction of officers of other armies, and it is wholly doubtful whether we can do much by following them. To summarize, we do not maintain a force or have a system of recruiting which enables us to work on our men in the same way; we have no general staff and it is doubtful whether we need or could use one, and Regular officers must so far as they can make up for the deficiency; we are a small force in comparison to the wealth and population, and the possibilities for being called upon at any time to exercise higher commands is greater. In fact our conditions, our relations to the country at large are different from those of any of the large armies. It is these conditions and not theirs we have to meet. It is therefore perhaps best to take up the subject as to what our officers should know in a manner independently.

All will agree that line officers should receive practical development in the following: How to take care of, discipline, command and instruct those under them, how to exercise properly at least the functions of one's grade, and to be ready for promotion to the next grade; all this either in peace or war. This is the narrowest view that can be taken. In addition is the necessity of being prepared to help in the great task of getting into shape as soon as possible a large volunteer army, and to perform the duties of any command or military staff position to which we may be called. To attain this result it does not seem desirable to teach directly the special functions of a general command; officers will learn those things if qualified to exercise them. The best way would seem to train thoroughly in all the duties of a regimental officer and in certain practical knowledge which not only assists in the creation of tactical readiness on the field of battle, but which we should be familiar with on account of the non-existence of a trained general staff, and of a ready organized engineer corps of a size proportional to a large force. Other matters can well be left to special schools and to the officers themselves. The following is therefore suggested as the scope of training for the body of our officers:

The care of men in camp and garrison involves a knowledge of considerable detail. It is their proper care in the field where the most difficulties are met, where ordinary routine is upset, and contingencies will be best met by those best informed, and with the most practical experience. This is a field too where regular officers can first make their influence most felt in dealing with

raw troops. The proper handling of the ration involves an actual knowledge of how to eke it out and cook it. While the details of this will, of course, fall on an enlisted man, the officer should understand practically the actual cooking, to see whether it is done right, and correct mistakes. Both the boys and girls of many of our wealthy families are taught to cook and there are many officers in our service to-day who have not been above learning how to cook the ration. Besides this are the many details in making camp properly, under all sorts of conditions, construction of ovens, sinks, shelters, etc., matters of hygiene both as applying to the camp and to the person of the soldier. First aid to the injured is in this category, but it has been given undue importance ahead of other matters in recent orders bearing on instruction.

Command and discipline involve much practical and theoretical knowledge. First of all a knowledge of men, firmness, justness, and a strong strain of humanity, knowledge of administration, of military law ; we all know that with most men, if a reasonable amount of foresight is shown in making provision for their comfort, or rather for the absence of unnecessary hardship, and they are treated justly, there are few sacrifices which they will not share with their officers. It is the indifference of officers, whether arising through thoughtlessness, incompetence or selfishness, which as a rule brings insubordination and mutiny. Codding is not only wholly unnecessary but harmful. It is only reasonable foresight, care and justness that the body of men expect or care for.

How to instruct officers or men is an important qualification. Knowledge of the subject must be presumed, but an absence of judgment, sincerity and earnestness is a worse fault than some ignorance. We see some who know their drill-book by heart, who never give a wrong command, who accomplish few results through an absence of the above qualities. It is encouraging that the board which during the last two years has examined the majority of officers coming up for promotion has considered their bearing and manner of giving commands in marking on practical examination in drill.

To obtain the best handling of men in time of war, an officer must be thoroughly familiar with advance and rear guard duty, outposts, patrols, in fact, with all that general division of the art of war known as Security and Information. To perform these

duties he requires habits of self-reliance, quick judgment, the faculty of finding his way about country, of rapidly observing faint indications, a good memory for ground, physical endurance, and tactical knowledge, frequently of a high order even in a junior with a small command. He also wants to be able to report what he has seen, and the better and more rapidly he can make a map to illustrate this the more valuable his work. A knowledge of the language of the opposing forces, or of the people of the country where operations are going on, is of course of high value.

On the field of battle the more good sound tactical knowledge existing amongst the officers the better. The only sound tactical knowledge is that obtained through practical study with reference to ground; while this can be carried on to a great extent in the study by the trained mind, with reference to maps or by picturing an extent of country, one to use a map intelligently should be able to see in his mind the ground when he looks at the map. In fact, practical knowledge of tactics and of the duties of security and information are so dependent on a thorough knowledge of the military capabilities of ground, and the ability to take into the mind rapidly a piece of country, that training in this faculty is of the first importance. It can be obtained of course by the voluntary self-training of officers, but I am convinced that the best way to obtain it is by *military* topographical work. Valuable as maps are for active operations, teaching officers such work only for the purpose of obtaining them, enters as a small factor compared to their value as a means to what is more important to the greater number, viz.: to observe ground closely and rapidly with regard to its tactical possibilities. A comparatively small number of officers can be spared for general map work in time of war, but all can frequently use the faculty to advantage on advance guard, outpost and patrol work. Moreover, those who can do contour work can read maps with more facility. There are still other considerations making topographical work valuable. It would give younger officers some opportunity to be separated from the leading strings of the company and other commanders; it will replace to some extent the old duties on the frontier where officers were thrown on their own resources in detachment work or in the staff departments, where self-reliance at least was taught. Moreover this is hard work if well done, keeps both body and mind employed, increases

powers of bodily endurance and quickens the perceptions. Making contour maps enables one to use more understandingly and less laboriously the maps of battle fields, and to follow the results with more profit. In fact, it is a most profitable military accomplishment from so many points of view that it has been a source of wonder to me for many years why comparatively so little attention has been paid to it. Poring over books and maps does not increase much the active faculties. This sort of work mixed in due proportion with out-of-door tactical studies and the mastery of books should produce good results where the natural foundation exists.

In connection with topographical work is that of reconnoissance, of seeing and reporting what is of interest in a military sense, and officers will probably be called upon for more work of this kind in time of war than for the production of maps. It has a more distinct value of its own than the latter, which as stated, has its principal value as an adjunct to tactical work.

The elements of field engineering should be practically familiar to line officers of our army. This subject is closely allied to those of topography and tactics, and it may be fairly said that he who does not understand the tactical possibilities of ground cannot make a good military engineer, and knowledge of field engineering is an efficient aid to tactical work. One may study these tactical possibilities without acquiring the technical skill of the topographer, but the three studies should go hand in hand. Napoleon says the best qualification for a good military engineer is common sense. Of course he presumed a technical foundation. It is quick judgment and an eye for ground that is wanted and which does not depend on an elaborate map and long and careful study in the closet. We know that during the Civil War Regular officers were used extensively to assist in engineering work, notably at the siege of Vicksburg, when General Grant called upon all officers having knowledge in this direction to assist.

Knowledge of our drill books, it is hardly necessary to say, is an essential amongst line officers. There is little to be said on this score, as proficiency exists as a rule, especially in the close order drill. With reference to the extended order, the spirit of the drill-book is too frequently not carried out; it is not merged into the true study of tactics sufficiently. As to the practical study of tactics, it is fair to say that a bridge engineer could as

reasonably omit the study of strains as for an officer of the line to omit the study of tactics. And yet an officer could get along pretty well in our army, have even some reputation for efficiency without any real knowledge on this important matter. Many, perhaps most of us, can look back through considerable service and recall few or no instances where the subject had been seriously approached at drills. Our drill regulations form a portion of our tactical training—an important portion—they are a means to an end, and yet we see them treated so much as the final end of tactical work. Were the spirit of extended order drill carried out real tactical work would result. As it is we go to two extremes. Much the same methods that must apply to the close order are carried into them. They are converted into purely mechanical evolutions, excepting that the men march at ease. We go through normal battle formations without reference to the ground in much the same fashion that we execute front into line; this is one extreme. The other is to get up a sham fight, in which ideas of tactical cohesion are thrown to the winds, where direction and control are lost. This is because the men in company, the companies in battalion, and the battalions in regiment have not been taught with deliberation fire discipline, the advance of a line which shall be at once cohesive and give the elements an opportunity to use their fire, and the minor accidents of the ground, nor the bringing up of supports with reference to their suffering the least loss, and having them there at the right time. The normal formations of the drill book are only advisory, anyway, and the board it is hoped did not expect to do all the tactical thinking for the army until the arrival of another book. Indeed, the question of tactics cannot be placed between the covers of a book. It is one to be studied with reference to ground, to be practised with reference to ground, and it is as necessary for officers to be doing this as for the surgeon to study his profession with reference to the human body; more necessary than any one subject beside discipline, more necessary than "first aid," more so than musical gymnastics, more so than signalling, more so than all the material perhaps on the pages of the text-books on which we are examined. It is far from my purpose to speak contemptuously of the text-books, but of the use to which they are put. In fact if an officer desires to acquire tactical knowledge to-day he must do it mostly by himself. We hear this attributed to lack of having large bodies together. We had best be doing at our posts with

what we have before raising the cry for concentration for manœuvres. In tactics, as in every other art or science, for that matter, knowledge of value must consist in laying firmly in the mind the deep underlying principles. Study of precedents helps to form these principles and to fix them in the mind, but beyond this it would seem wise in studying tactics to let go of precedent somewhat after getting hold of the principles, and store up in the mind in preference a large number of precedents from problems thought out on all sorts of ground on sound principles. The mind then will be ready to seize immediately about the best tactical solution when called upon to act quickly. In truth, an effective man will train himself to think, especially where rapid judgment is necessary, not how Napoleon, or Frederick, or Grant, would have done this thing, but how he himself will do it. He is the one to do it, not his great predecessors in the art of war.

Our tactical instruction is, it seems to me, the most unsound thing in our service. Indeed, to hear much of the talk on the subject and to see many of the methods used, one might grow to think, if he allowed himself to be influenced, that there is no such a thing as tactics excepting the close order drill and the purely mechanical performance of the extended order. We see companies going for months and learning nothing but the manner of deploying and assembling, without hearing the wholly important question of fire discipline more than barely referred to, and a battalion and regiment going, time after time, through the normal formation without reference to the ground. We see a whole regiment deployed as a firing line and supports, and advancing with accurate alignment over ground that could not be so used in actual conflict. We find, in order to obtain this alignment, that one company is halted in a hole from which it could not fire, and only a few feet behind a position from which it could, another is thrust a few feet beyond good cover from which it could also fire freely, to be exposed on a steep slope to full view and whence it is almost impossible to fire from the prone position. Supports go forward dressed on each other in the same way. When the rigid line is abandoned the companies are turned loose without reference to alignment or cohesion. The sending forward of supports seems not to be considered as a matter on which the ground may have some bearing, but the whole question is left to be solved by the normal formation of the drill-book. This all saves much thinking, but it is almost worse than no drill at all.

It teaches nothing, unless it be that there will be some awful blundering. There is such a thing as teaching fire discipline, teaching men to always aim at a definite object, to save their ammunition, to fire only when they can see something to fire at, to keep under the control of orders and obey visual signals; there is such a thing as training a long firing line to advance on a general alignment as a cohesive line and yet allow each platoon or company to develop its fire and obtain some immunity from loss through accidents of ground; there is such a thing as sending supports forward so that their formation shall be as little vulnerable as may be; there is such a thing as officers being trained in the tactical possibilities of ground, not in fanciful theories, but in sound principles. It is an appreciation and knowledge of these questions which constitute tactical training. It seems almost absurd to indulge in a long argument to prove that tactics should be studied in the army. They are studied faithfully by many, but as a rule, they must carry it on by themselves, and excepting for their own satisfaction they are out of the swim compared to those who are satisfied to join in long discussions on minor points of the drill-book, well enough settled by the board. In fact, let a large amount of mediocre talent be spread out on paper or otherwise on the minor points of drill, and an officer can set up as a tactician. The writer believes in sharp, accurate drills, and would welcome a return to what we abandoned five years ago. It is not an objection to careful detail at all, but to mediocrity setting itself up as a tactician when it really never thought of the subject of tactics and cannot be made to think of it, indeed believes it is all between the blue covers of the drill-book. The book has faults, but the principal fault to be found is that certain good things in it are not in very large type and that company and other commanders are not positively instructed to follow them, and given to understand that they must.

Knowledge of the ballistic properties of the weapons to be employed by and against us, and to what extent these properties will be made use of by those handling them, study of fire effects and learning to make the most of and to avoid them, undertaken with reference to ground, makes up so much of tactics that no work on the latter subject can be complete which does not deal with the questions cited. It is about as important to know the effects particularly of shrapnel and machine-gun fire as of the rifle. The entire subject of fire effects is one which can be shorn

of much formula. A few simple tables, and the enunciation of a few sound principles, briefly discussed, is sufficient for officers if thoroughly familiar with them. Large books may be filled with elaborate and really valuable discussions, but such are not necessary for text books, and a comprehensive knowledge may be obtained without them.

There is another study which might be made compulsory amongst our officers. It is the obtaining of a good speaking knowledge of Spanish. Whether or not it should be made compulsory for all, it is important. This is hardly the place for a discussion on the future relations between us and the many Spanish speaking countries to our south, but who looks into the matter at all cannot but be convinced that there may be danger of complications at any time where the army would be used. The people of our country are not looking upon them with an eye to military conquest, and the writer does not mean to advance the opinion or desire that we will attempt to extend our domain in that direction. Great interests are being obtained by our people in Spanish America. The countries are rich and awaiting development, and the interests existing there now are nothing to what will be obtained in the coming years. We all know the utter instability of most of the governments, that foreigners with large interests rarely lose allegiance to their strong home governments. They sacrifice their political to preserve their civil rights. Without further discussion of the matter the plain fact stares us in the face that the interests of our people will have to be protected always. Such matters have been known to go outside of the hands of diplomacy into those of the army and navy. Without thinking of foreign conquest or bothering ourselves much on political matters it becomes well-nigh a confirmed duty for us as officers to make ourselves familiar with the language of the countries where the interests of our people are involved. May we never have trouble with any of them through a desire to interfere, and may they all be able to work out their salvation without our interference. But the army is kept for contingencies, and it is our duty as officers to view future contingencies and fit ourselves to meet them—that is all.

It is very doubtful whether it is necessary to enforce on officers generally much study in logistics and strategy, especially in the latter. Those who will need these matters will study them anyway. In fact, there will always be a very large number study-

ing in these directions, perhaps more, under a purely voluntary system, than would be studying tactics, or the practical details and accomplishments which really speak for the efficiency of the military force. It may be said that there are probably fewer difficulties attending the study of strategy than of tactics, as taught in any book. It is certain that the latter require more practical training, and it is even more certain that more officers will be required to need this knowledge. Perhaps a strategist will now and then be developed who is weak in tactics. However, we need not consider such an exception in a general scheme, and it is probably safe to leave this study of strategy to officers themselves, or to a war college, and the same may be said of logistics; this at least for the present until it is demonstrated fully that the main body has come up to a certain standard in these minor practical details.

We now have signalling practically taught. It is difficult to see wherein the subject is of great importance, especially as compared with others. We have a special signal corps with a brigadier general at its head, and with the remaining personnel. It would have a large amount of almost ready-made material to draw upon in time of war, better than anything to be found in the army, and more available. We would not want to spare a single officer trained to command on the field, or a single man trained in discipline and the use of the rifle for the signal corps. In case of riots in cities it would be convenient, but even here we do not want to spare men from our small commands. In the cities our signal corps would handle the work, and entirely, and we would object to details being made to help it. Its convenience where a small command is strung out along a long line of railroad to keep it open, the wires being down, is perhaps sufficient to keep up the instruction we now have in signalling, especially as it is the one subject outside of parade ground drill and target practice in which we now have a practical examination. It might be valuable on the cavalry screen, but probably certain conventional signs would be used. Telegraphy might be valuable to an officer seizing a telegraph office, if he had no telegrapher with him, but it is questionable whether for some remote contingency it is well to crowd out more important things, especially for American Regular officers who will have their hands full in time of war.

Beside the mental training of officers, comes in the question

of the physical. It is one with which orders can have little to do after finishing with us at school, excepting to enforce that company officers shall in the matter of riding, running, jumping ditches, escalating walls and marching, be able to do what the men can. Great powers of physical as well as mental endurance, and actual indifference to hardship are certainly valuable qualities for an officer to have. These are largely questions of will and temperament.

The foregoing matters are mostly such as pertain to all line officers. In addition, the cavalryman must understand the horse, how to care for him, train him, know when to make the best use of mounted action and when not to use it. The cavalry officer will have more work pertaining to security and information, more rough topographical work, and in field engineering more hasty demolition; but less probably of other engineering work than the infantryman. The light artillery has its horses and material to care for, the heavy artillery the handling of complicated machinery. So far as tactical training is concerned all arms should understand well the functions of the other two. In fact, all our officers would be well off if they could receive training as cavalry, light artillery and infantry. As this would, to be carried out properly, involve legislation, the question is only touched upon in this place.

As to the best manner of carrying out the instruction in the various practical details referred to above, the writer ventures some suggestions.

A large number of these matters should necessarily be carried out in the company, some by direct instruction, but largely when thus obtained by observation in garrison and the field. As to the cooking and management of the ration there could be some study encouraged on the simple chemistry of cooking and sufficient inspection of messes by the captain, accompanied by the lieutenants, to enable them to understand a good deal of practical cooking—this should be done especially in the field, where in conjunction with some work in garrison all soon learn according to their aptitude the numerous minor points in taking care of men. Probably the best means of instructing officers and men in the matter of being always ready for the field is to order organizations out on short marches on an hour's notice. By always expecting it they will be always ready both as to matters of equipment and physically. Our service is for the most part not deficient to-day in this

duty of being able to look out for men, horses and material in the field. The question is one to be solved now mostly by practice marches. The soldier's handbook covers many of the essentials. Experience, observation and forethought, reading to obtain the advantage of others' experience, are of course the means of obtaining efficiency. Although this heading is discussed first as being about the most important, the writer will not go into further discussion of it, believing that it is fully appreciated.

As to company papers, it is a good plan to insist on a lieutenant in his first service making out those for a full quarter, including a quartermaster's return, with little assistance. He thus obtains at least an insight into the whole scope of muster rolls, returns, payments and property accountability in the most direct way.

On the subject of drills and tactical instruction there is much to be said. While many in the army are not satisfied with our drill regulations, there seems more room for criticism on the failure to carry out their spirit than in the regulations themselves. Without entering into a discussion on the merits of these regulations, it is proposed here to suggest what seems to the writer the most important features of drill and tactical instruction.

Practical work in drill regulations is of course carried on entirely in connection with the men, in other tactical work much of it should not be. As to the close order drill we are, as a rule, proficient, and so are our organizations. There are a few things, however, to be said about it. There is a tendency in some cavalry organizations to neglect the dismounted drill, and it is perhaps growing. Without disputing the certain value of the action of mounted cavalry on the battle-field on many occasions, it is equally certain that they will also be compelled to manœuvre on foot, and should be trained to it. The foot batteries receive such instruction perforce for the uses of ceremony. While artillery will be used as infantry in time of civil disorders, it needs little instruction of this kind for actual war.

The general faults in our instruction in extended order drill have been referred to. The drill regulations are sufficient guide for carrying out most of this drill in the company, excepting that too many commands are laid down for bringing a line to the halt and to commence firing. As soon as manœuvres of deploying and assembling are well understood, the work on varied ground should take place, and it should be enforced on company com-

manders. At every company drill at least one advance should be made against an imaginary position, and every man be required at all times to go through the deliberate motions of loading, aiming and firing, always at some object with the approximate range. Of all things the most important is probably to teach them to fire at something—never to pull the trigger unless the rifle is aimed at something to indicate the enemy. It should be repeated and ground into men until when under actual fire they will remember it if they forget everything else. Beside this is the effective and rapid handling of the piece—to teach them to do everything else rapidly and mechanically but aiming, and that to do as rapidly as possible, but deliberately. Much of this instruction should be given in the squad, especially the manipulation of the piece. The extended line should be drilled much in moving forward at double time and the run without disorder. Indeed, there is not sufficient double timing in our company drills and too often we find officers and men easily winded. These questions of rapidly moving forward in good order, deliberate aim at the enemy and controlling fire are the most important matters, perhaps, in the training of men for action, and they should be impressed on all officers as a part of their training. They should, moreover, teach the men to keep in touch with them by much use of the whistle and visual signals. Many act as though the whole subject of instruction in fire discipline is solved by that obtained in target practice. It is an efficient aid and that is all. It would, perhaps, be desirable if most of the known distance shooting, excepting at 200, 300 and 600 yards were eliminated excepting volleys as now prescribed, and an increase be made in the amount of skirmish firing. This and the volley firing are the real indication of the proficiency of the company for service, although some known distance firing is necessary. Yet a company might be trained up to do good work during a month, and if the principle of accurate aim always whenever the trigger is pulled be not inculcated during the remainder of the year, not do very good work in actual service. The question of teaching men to seek cover is not really important, but teaching them in the company to maintain a fairly accurate line and learn to drop in a position from which they can see to fire, is important. We have all seen at company and other drills men lying behind a bank from which they could see nothing but sky, listlessly going through the mechanical motions of loading and

firing. This is not usually the fault of the men. They should be always taught to drop as soon as they halt, and if halted behind a ridge somewhere nearly parallel to the line to move up to a point from which they can see, and if necessary rise to fire. Constant effort should be made to preserve alignment and distances, and to halt where the enemy can be seen, as there will always be sufficient individual talent displayed in the matter of seeking cover.

Advance guard, outpost and patrol work is perhaps best learned by the officer in instructing the men in actual work of this sort. While much of it should be given by careful instruction in the company working alone and against other companies, most of this work should be in connection with larger organizations.

Gymnastic work pertains essentially to the company, and ability to instruct in it enters of course as a company officer's duty. While it should be continued to some extent throughout the year, it should without doubt be mostly employed during the inclement months, and used out-of-doors mostly in the direction of running, jumping ditches and escalading walls, all really features of extended order drill. The same can be said of riding-hall drill, and in the artillery much pertaining to manipulation of the piece.

A large proportion of the practical work in military field engineering pertains to instruction of the men in the company, making gabions, fascines and other revetting material, making hasty intrenchments and other shelter, construction of simple bridges, when we have the material, are all things which the men should learn in the three years, and without a great expenditure of time.

So far as work in our companies and the teaching of our men is concerned we are almost as well off as though enabled to concentrate large forces for manœuvres. In fact, so far as much of our work as officers is concerned, we imagine more than is really justified that we could learn more if we could have those large forces. Let us do the most with what we have, not by imagining that the three or four hundred men we get out for drill at our regimental posts are three or four thousand, and scattering them over ground they would never be expected to defend or attack, but by using them right always. A force may be "imaginary or outlined," but if "represented," let it be one that could do some-

thing in the place it is defending or attacking. In matters of instruction we may require the officer to imagine that a great deal is going on away from his immediate vicinity, for example, that two hundred men on each side acting as advance guard have larger forces supporting them in rear, that an assault is being made by a long line and the force used is only a portion, that a position for defense is being taken up in the best way and that there are large supports and reserves behind, or that the force is defending a portion of a considerable line. The question of using a force in attack as a portion of a supposed larger force is more difficult, but it would be an efficient drill to deploy all the companies of a battalion, or of two and train them thoroughly in advancing as the firing line without supports against an outlined position, keeping up a general alignment on a directing company, fixing an approximate distance, as fifty yards, which they should not get ahead of or behind this company. Then each company could develop its fire, obtain such cover as it could, lie in wait if ahead under the best shelter, or run rapidly over the most exposed ground, and we would still have a cohesive advance, which is wanted. This drill would be the same in its general features on all sorts of ground, and should be frequent to insure the steady advance. It may be said that it is the only portion of tactical battle formations which should be normal, as the rest should depend solely on the ground; in other words, the feeding of this firing line, the bringing up of supports and reserves and of subsequent lines, should be regulated by the ground, depending always on the necessity of an ordered advance. Herein lies much of the benefit of thorough training in close order drill, and this question of adapting formations to the cover attainable or to the angle the ground makes with the line of fire, forms a large portion of the science of tactics. There is not space here to discuss to any extent this science, but I take it that questions of tactics can be studied only with reference to various types of ground, that it is useless to lay down hard and fast rules. Many hold that this question of taking men into action is inspiration which develops at the time. It is certainly more inspiration than the following of normal formations from a drill-book. The word has been discussed at such length as to its religious meaning that I will not involve myself in discussing it here. Call it inspiration if you will, but let us cultivate our inspiration. If we are not all to have it ourselves let us study into the logic of these matters.

Then when our more gifted brother officers give rein to their inspiration, which will probably not violate common sense, we will at least see what they are about and succeed in helping out the general result. Neither Moses nor Mahomet were men who sat around waiting to be inspired. There is much meaning, too, in the word as applied to military matters, traits which cannot much be trained into men, although they may perhaps be trained out, but thought, observation on the ground and discussion of tactical matters, practice in battle formations, will beyond a doubt train men and enable them to act more quickly, will cultivate inspiration or assist in helping out that of others. We can then discuss certain formations suitable for certain types of ground, and if satisfied lay up in our minds our own thought or that of others for future use. We can study formations suitable for bringing up supports and reserves over ground broken parallel or perpendicular to the enemy's general line, over ground inclined to the line of fire, defense and assault of positions on hills of different heights and different degrees of steepness of slope, of woods, farm houses or groups of buildings, villages, defiles, etc. While no two portions of ground are just alike, they will exhibit certain features and combinations, and the mind trained beforehand, natural capacity being equal, will have the advantage over the one that is not. While we cannot adopt rigid rules we can arrive at pretty correct general principles. We do not want fanciful theories or formations, but sound principles, and understanding these an officer who can see into the ground before him, will without a labored calculation on trajectories, angles of fall, etc., determine what to do quickly and give his orders accordingly. If subordinates are trained they will understand and carry out orders properly. Practice and discussion on the ground with and without troops will bring this tactical training if it can be taught. It cannot be obtained from books, although they may assist in the general result, especially with one who has some natural or cultivated eye for ground, and does some such out-of-door study even by himself.

Most of the minor operations of war can be carried on practically at our regimental posts, and time should be devoted to them. The writer is not sufficiently enthusiastic to wish to see all of his own or of others' time taken up week in and week out with these matters. If but little more than that now employed at posts were directed into the best channels and the work amplified by con-

centrating yearly the troops of different posts with the National Guard, results would be obtained of the highest value, but we want first to be able in all cases to teach the National Guard what is right.

Instruction of officers on ground without troops has, in some respects, advantages over work with troops, especially as our commands are so small. They should be taken out in a body and positions and formations freely discussed on a well-arranged plan. It could be done with deliberation and absence from restraint. Each officer would be placed on his mettle and made to think on tactical matters, and would obtain the benefit of the ideas of others. The troops could be subsequently used on the same ground to illustrate at least a portion of the discussion. Every one would then know what he is doing. When we have movements requiring umpires or resulting in a subsequent critique, the umpires should be sent out beforehand to study the ground thoroughly and a critique be given to the assembled officers on the spot. Elaborate criticisms made up and read out several days after are of little value. As an adjunct to the work in minor operations there should be at each post a topographical (contoured) map of the vicinity or the portions of it over which tactical work is to be done. By issuing copies to all officers and having it copied on a large board we could use it to some extent for work during the winter (or summer in the extreme south). Such a map could take in portions of ground off the reservation, if necessary, as tactical discussion can go on without troops. This map would be something of an undertaking, but there is probably sufficient topographical talent at most posts to produce it. It is referred to again under the subject of topographical work.

The question of handling riots is one in which the officers and men require tactical and other training. One of the important things in this connection is for officers, particularly, to be well acquainted with the cities near which they are stationed. Either by personal visits, or for lack of that, study of the maps. Here, perhaps, we can find some use for our practice in signalling, and certainly among both officers and men abundant opportunity for firmness and forbearance. Probably the most important thing for us to understand is the limitations of the military in its connection with the civil power. By understanding these thoroughly we can act confidently within them. Through ignorance the in-

discreet will make trouble by exceeding authority; the over-cautious will fail of accomplishment by not acting up to the authority vested in him.

The instruction at posts should be such that when we can obtain a concentration of Regular troops or with the National Guard, time will not be wasted on matters of minor detail, so that we can utilize to the utmost the increased force for tactical work.

Officers should be encouraged to visit the battle-fields of our Civil War and those of Europe, and while actually so employed be given a status similar to a hunting leave, paying their own expenses, but not having the time count against the authorized leave.

Instruction to-day is aimed mostly at lieutenants, partially at captains, and none to speak of at field officers. The first two are being taught in theory at least most of the matters which, if taught practically, would go to make up the thoroughly useful officer. We have the general subjects of the functions of each of the three arms and of all combined well handled in various books, but the real, live subject of tactics we have to pick up here and there from books, from ideas put forth in our magazine articles, from observation and thought. We might drill alongside of an officer for a year and hardly know his views or how he would act. The field officers are our natural instructors in this subject. To-day if our army were mobilized and concentrated for action we could rely on each other in many ways. We would find mostly honorable gentlemen, devoted to their duty and to the cause; we would find generally a uniform system of discipline, of court martial practice, of administration and keeping papers; we would probably find considerable proficiency throughout in the performance of the duties of security and information, especially on the part of the officers who have knocked about on the frontier, or taken some interest in finding out about the country near their posts; we would find entire uniformity in close-order drill. In fact, we would have a brave, well-behaved army, ready to fight and fight well if led into engagements with any sort of judgment as to tactical questions. Here we would fail, if the work most of us are accustomed to seeing in time of peace is an index as to what we would do in war, and no inspiration is going to come to bring a change. What would happen, and on this point I challenge contradiction, is that whether we should be contending on the north against the English regulars and fairly disciplined forces

of the Canada militia on ground much like that seen in our own country, or against the guerrilla warfare we would meet on the south amongst the sugar, coffee, or banana plantations, or dense undergrowth and forests of the tropics, we would mostly be led into action, according to the way it was done during the War of the Rebellion, according to the normal formations laid down in our drill-book, or be turned loose without reference to the nature of the ground or to cohesive action. Some would send their dressed lines of skirmishers through forests and sugar brakes, over rolling country, when one portion would be exposed to a galling fire while the other stood helpless out of sight and unable to fire. Some would turn the companies loose, and have them advance with reference to cover, and without reference to a combined action, supports would be sent forward without reference to cover, without reference to the best formations adapted to the ground. We would see our brave comrades and men falling around us instead of advancing to victory, find ourselves unsupported in advance of the rest, or in a hole where we could do nothing. All this we would see, and more of this than of good formations. If victory should be ours it would be due to the bravery of our officers and men, and not to skill in the use of proper tactical formations or methods of advance. This, as a rule, as there would be exceptions, but it is questionable whether the exceptions would find their ideas immediately understood. Anything not in the drill-book might be looked upon by many as a fancy theory. It is not a pleasant outlook and is not being remedied in the least by our examinations or increase in the matter of theoretical study. While a large number of thoughtful men appreciate all this, a large number are following the force of the example set. If it is possible to bring about a change in this matter it should be done. There is, perhaps, a remedy; it is to start a school for field officers. Let the proceeding be a wholly dignified one and not a school-boy affair at all. It could be carried out in this way: Issue an order creating a board of field officers to meet in or near the Chickamauga Park for the consideration of tactical questions. The board to consist of a certain number of cavalry, infantry and artillery field officers. Before the board meets a number of tracts of ground of different types with varied features, some with houses and villages, if practicable, should be selected and mapped, with care, and a number of tactical problems elaborated. Lay down for the board sound tactical principles from which they are

not to depart. Let them assemble from day to day and discuss the tactical formations to be taken by a battalion, regiment and brigade, acting alone and as portions of another force. Also where artillery and cavalry should be stationed, when and how they could act to the best advantage. Also affairs of outposts and advance guards, and the attack and defence of woods, houses, etc. There need be no instructors, but junior officers could be detailed as recorders to keep track of the decisions of the board, which should for each day be final. There should be no report required, beyond this daily record. In fact, the report to be a secondary matter, the main object being to inculcate in the field officers the sound tactical principles. The detail of each field officer not to be prolonged over two months, unless certain ones are detained to assist with the next board. The proceedings to be forwarded immediately, and perhaps after a critique by or under the direction of the Commanding General of the army, a copy of this, and the maps showing formations be sent to each field officer, who could then be required to submit his individual views. If such a proposition should terminate in a tactical board of a few officers to spend a number of years getting up a lot of wooden formations and rules to be used on various sorts of ground it would be most unfortunate. If the board is compelled to work on good principles, there will be sufficient uniformity obtained. Tactical questions are matters to be solved by judgment on the ground, on certain sound ideas, depending on the quality of the men, of the opponent, on the ballistic properties of the weapons, and the proportion of different arms engaged, and nothing more than the dissemination of sound general principles is aimed at. This plan would not be difficult of accomplishment. The maps could easily be made up and blue printed, and the other expense would also be slight, involving only the cost of mileage, a comfortable camp and mounts for the officers. All of it could probably be done without special appropriation. Those who would condemn such a course could find their only argument in a want of intelligence on the part of our field officers. This is not admissible. Such a system pursued each year, supplemented by an enforcement of many of the important but neglected provisions and some revision of our drill-book and proper instruction, would introduce some general uniformity in our tactical training, would give us, if thrown together, some idea as to what others would do, some feeling of confidence that each other's work would be

supported. We cannot get our whole army or even a considerable portion of it together to give this element of uniformity of training—our post graduate schools for juniors cannot accomplish it, as the graduates make little impress, however sound their knowledge. Moreover, they know no more, and often less, than many officers who have not attended. This field officers' board would meet the question as well as it could be met under our conditions. It might be the foundation of a splendid war college. Its success would be exactly in proportion to the interest and intelligence displayed by the field officers, and if a failure resulted it would be due to them, unless some ambitious pedagogue wanted to stand them up in a row for recitations or tried to enforce written examinations or other ill-devised methods. It would seem at least to be worth trying. The writer has advanced this idea to a number of officers, and has not been met with an argument against it.

The study of tactics should be carried on in the same general way for all arms, officers of each arm to have a special knowledge of the use of his own, but all to have a clear idea of the functions of the other two. No intelligent study of tactics can rest on any other basis. The artillery officer should be better informed as to where he can take his pieces, and the best positions, the cavalryman must know where and when to use a body of horse. For both a quick appreciation of ground is above all necessary. The training of infantry has been discussed more in the preceding pages than the other arms, because on an efficient system for it depends so much. Both the other arms require more training for officers and men, and the officer has more company work, and more study to perfect himself in his special branch. On knowledge of horses and material there is no general deficiency. Indeed, throughout the service each arm has a pretty thorough knowledge of its drill regulations and other matters, and the principal motive of these pages is an argument for more general and practical study of tactics, field engineering and topography, the latter two as a means largely for mastering the first.

As before remarked, the mere theoretical study of topography is meaningless. The course at West Point in descriptive geometry, descriptive and other drawing, and especially one plane projection, with what is taught in map making there, and with a practical knowledge of and readiness in handling the simpler instruments is, in my opinion, a better foundation for practical

instruction in the military topographer's art than any book I have seen on the subject. It becomes a question of some technical skill with the pencil, protractor, scales and other instruments, and principally a correct appreciation of slopes and conveying to paper by means of contours a representation of them. So far as other details are concerned, their representation is a simple matter compared to that of handling contours rapidly and with an approximate degree of accuracy. There are some men who cannot learn topography, occasionally because they cannot draw, but generally because incapable of obtaining a correct appreciation of ground. Any one with this faculty who can draw a little can learn topography under a proper system of instruction in making contours. Indeed, without this faculty, one may be a fine draughtsman, may be an expert with instruments, a fine land surveyor, a computer of the highest grade, and be incapable of doing rapid military topographical work. None of these qualifications are necessary for a military man. The faculty referred to is capable of cultivation, and in no way more than in this work. The method recommended is through the use of the transit and stadia. These to be employed as a *means only* in obtaining data to be used by those undergoing instruction. They need not be experts with the transit, in fact, have nothing to do with handling it. There is no doubt that working with a skilled topographer is the best means of obtaining proficiency, but this system can be carried out at any post provided there is a transit and one person who can use it. The stadia rods can be made and tested with no trouble by consulting Johnson's or Root's works. Before beginning work an officer should understand thoroughly the compass, clinometer, the range finder he is to use, and platting angles. The West Point course or somewhere near its equivalent is presumed. Practice should be had in handling the stadia reduction tables, which should be copied on the back of the field drawing board for each ten minutes of arc up to 10° , each $30'$ to 15° , and each degree to 30° . Deducing the difference of height between two objects involves only the multiplication of two numbers of three or four figures each. Each officer to have a drawing board about $12'' \times 18''$, a protractor and proper pencils. The best paper to use is that laid off in squares of one inch to assist in guiding the protractor. Some initial altitude is assumed, the transit is set up at a station and a large number of stadia readings taken all around the arc. The bearing, distance and vertical angle are

read, called off, and platted : from the latter two the difference of altitude is immediately calculated. Thus the altitude of a large number of points becomes known and contours can be drawn in correctly. The work should proceed slowly at first, and only about four courses taken, of about 800 feet each, closing on the first point. Then a closed line of six to eight miles to be run, and the work balanced horizontally and vertically. With this as a basis those under instruction should proceed with hand compass, clinometer, and perhaps range-finder and aneroid, and fill in the area mostly by pacing. Any one who could ever learn topography would by this means be able to produce a fair sort of a contour map. He would see his results before him and know what they mean, ascertain his own faults and be able to correct them. His eye becomes trained ; he would then be able to begin work with the cavalry sketching case. If one or two only of those present had some practical skill, so much the better, but this course would be adapted to any graduate (or one possessing a fair equivalent) who has the least natural facility. After this a number of days' practice with the sketching case, proceeding slowly at first and increasing to ten or fifteen miles in a day. Rapid use of the sketching case is the highest development of the topographer's art with instruments. To ride rapidly over a piece of ground and be able by quick observation and mental estimation of distances and slopes to make a fair sort of map, or to use a map and have it convey immediately a clear idea of the ground, is the highest development of the art, and the one perhaps more would use. Fifteen days of such field work shortly after graduation would, if added to occasionally from time to time, bring out the talent there is in the army in this direction. Topographical work could at all of our posts be turned to some use and officers be given independent work by filling in the maps of the country. The geological survey maps on a scale of one-half inch to one mile, or in their absence, the county maps could be used as a basis, and detachments sent out each year on bicycles or horseback could fill in blocks of country and report on its military features. In a few years a large amount of valuable data would result.

Of more *immediate* value would be the construction of good contour maps in the vicinity of our posts for work in connection with minor operations as referred to previously. The simplest way to make this is to run in all the roads with transit and stadia

and perhaps additional lines, balance up the work and fill in with the simpler instruments. This should be used as a means of giving an opportunity for practical work to as many officers as could be spared—from the line of file-closers for example, and the whole undertaking not placed on the shoulders of one man who probably needs no more practice. In this matter of practical topographical work there is no necessity for more than a short period each year being devoted to it. Moreover it should not be turned over to a few experts just to pile up handsome results. It would do no harm, however, to any officer in our service to put in one full season on such work undertaken seriously and not as a mere pastime, but always to draw on the same few men is wrong. Perhaps the cavalry officers will be called upon more than the other two arms to turn in maps and make reconnaissances, but all officers alike should have about the same training. Photography is of use as an adjunct to topographical work, but only as an adjunct. Of more value to officers is the ability to make a hasty landscape sketch showing by a few lines the most essential military features. On such sketches can be entered bearings, vertical angles and ranges, with references on the map and sketch. A photograph does not usually bring out as many essential features as a good sketch, as every one who has made the latter knows that there are constant changes of light and shade which show the lines of ridges and depressions, the ground developing as the sketch progresses; by using a field-glass many important features can be entered on a sketch which a photograph could not possibly show. It requires a strong memory and considerable practice to be able to identify objects on sketches, and put them together for the production of a map. The employment of photography in this way requires the most refined skill and personal inspection of the country, and in military work the great danger lies in accumulating a large number of photographs from which only meagre map results can be obtained, and then only through a tremendous amount of office work. Making the sketches is in itself a valuable training for observing ground, while making photographs is not. Photography is a valuable auxilliary, especially for balloon work, but we can always find expert photographers to do such auxilliary work, and the body of officers do not need the training. It can do no harm, unless it is the means of crowding out more important things, and unless the inexperienced through a knowledge of the theory, which is

most attractive, believe they can make good maps by employing it as a principal in place of only an auxilliary means. There is not space here to discuss in full the merits of photography and pencil sketches. The writer hopes that really valuable instruction in topographical work will not be crowded out by that in photography.

The practical course in military field engineering is to a considerable extent, as referred to above, a matter of company duty, of instruction of men. Outside of this is the selection of trace for all kinds of the simpler constructions, described in the elementary works, calculating dimensions, time, material, number of men and tools required, problems of defilade, etc. While not in favor of taking up a large amount of time of the men on useless fatigue, it would be useful to have a small redoubt, well placed and planned, at every post, so as to bring in the various shelters, traverses, bomb proofs, revetments, a magazine, and gradually build it up, thus using it as a means of instruction for a short period each year until it is completed. It could be further used as an object for attack and defense. There could be at each post pieces of timber of proper sizes cut for use in throwing simple spar and trestle bridges. They could be used time after time. A few hours a day for a week twice each year to each company in these simple details of field engineering would be of the greatest benefit. The instruction in this subject may vary somewhat for the different arms to meet their requirements and what they would be most likely to have the most of to do. The cavalry officer will have less than the infantry in the superintendence of construction of field works and more in the matter of hasty demolitions, and the artillery more in the selection of emplacements for their guns, more knowledge perhaps required of the works of a semi-permanent nature, and of siege works. However, as the infantry soldier will have a large proportion of the actual construction of all sorts of field works, of temporary bridges, the infantry officer should be as familiar with the elements of engineering as the artillery. The foot artillery has in addition, mechanical manœuvres which really come under this head, and with which the other arms are little concerned.

In the matter of enforcing theoretical instruction the system of recitations has become fastened on the army. There seems little to be said in its favor. Instead of sending officers to recite the same could be accomplished by requiring a written examina-

tion at the end of the time fixed for recitations in the subject, as set forth further on. To-day an officer may equip himself thoroughly in these matters, beyond the scope of the texts and still be required to recite. Moreover it is better to study a subject thoroughly and not by piecemeal, as in connection with the weekly recitations. Recitations are not suitable for grown-up men; those who need them can well be ignored. They are of little value to them, and are an unnecessary annoyance to others.

Because of our range of climate, and the liability of troops being called out for the performance of various duties, it is not possible to draw up a scheme for the division of time throughout our army, in which instruction in various subjects shall take place. This question of division of time should be left to department commanders, primarily and secondarily to post commanders. It would seem best, however, to prescribe from the headquarters of the army, the scope, general rules as to methods and, above all, what results are to be expected in practical work. There will necessarily be differences at each post, but officers going from one department to another should be able to carry with them their record on work so as not to be subjected to continued instruction in some of these matters after they have fully developed their efficiency.

The following course is merely a suggestion for officers after entering the service and to show what can be accomplished in two to three years. It must be borne in mind that the officer has usually studied a large portion of the subjects set forth. This work would continue with the regular post and company duties, excepting in the cases mentioned. The examination referred to is, unless otherwise specified, to be written and to take place near the end of the month in which made.

October.—Examination guard manual, and equipments of the soldier, and of the horse or horse and piece, according to arm.

November.—Practical examinations in drill regulations of arm, including school of the company, troop or battery, elements of fire discipline, gymnastics, clearing obstacles, jumping ditches.

December.—Quarterly papers of company, including one muster roll and return of quartermaster's property as formerly made. Muster roll to be made up from retained copy with the new data furnished. Examination, oral.

- January.—Security and information ; examination.
- February.—Elements of field engineering ; examination.
- March.—Firing regulations ; examination. Also practical instruction in handling simple topographical instruments.
- April.—Two weeks' course in topography, described above in connection with transit and stadia. No examination ; excused from all other duties during course.
- May.—A course in the elementary principles of the effects of fire of officers' own arm ; examination. During the last two months gallery practice has been in progress.
- June.—Target practice.
- July.—Finish target practice and practical work in signalling, in case it is retained.
- August.—Military engineering. Field work ; selection of trace of intrenchments, problems of defilade, calculating dimensions, time, etc., for the construction of certain earthworks. In general practical work without troops. During the year it is presumed that practical work with troops has been going on in matters affecting their instruction, which includes work in field engineering.
- September.—In the field.
- October.—Three days' work in connection with transit and stadia for practice in contours and seven or eight days' work with the sketching case, gradually lengthening the distance.
- November.—Post and regimental papers ; examination.
- December.—Drill regulations ; for each arm that now laid down for examination of 1st lieutenants for promotion, and ceremonies. Examination.
- January.—Lectures on cooking and handling the ration, or study of authorized texts and castrametation. Examination.
- February.—A course on the effects of fire—of the rifle as well as of shrapnel, rapid fire and Gatling guns. Examination.
- March.—Convoys and characteristics of the three arms. Examination.
- April.—A theoretical and practical examination in topography, using ground not previously worked over by officer.
- May.—A practical examination in field engineering.
- June—July.—Target practice.
- August.—Some practical work in signalling. All signalling work to be in connection with company.
- September.—After returning from camp require an essay of some

definite length to be written in three hours on the subject of camping.

In October about a week's work with sketching case.

November.—Practical examination on the ground, well mapped, of the effects of fire, especially of one's own arm.

December.—Examination in Military Law. This has been delayed until now as officers are usually pretty well equipped in this direction on entering and have considerable practice on courts.

Cavalry and artillery officers should have, in addition, special further examination on the care and use of material pertaining to their special arms.

During this course the officer would, of course, be obtaining practical instruction through the regular drills according to his arm, in close order, extended order, mounted and dismounted, or in the handling of the piece, etc. ; in advance guard and outpost work, patrolling, field engineering, target practice, gymnastics, clearing obstacles, jumping ditches, in fact, in all the matters in which our Regular companies can be made proficient with the large leaven of old (and who should be instructed) soldiers.

After completion of the foregoing course there could be during the following two years an examination in Organization and Tactics or the larger portion thereof ; also in Army Regulations and in the Relations of the Military to the Civil power, and before the end of the four years, in International and Constitutional Law. The greater part of this course would be review for graduates of the Academy, with the addition of the practical work. It would enforce the fact that these are the important details for an officer to remember.

The examinations should be rigid and be marked closely, not on following the language of the texts, but on accurate and clear knowledge, and the officer freed from further examinations according to his standing, for a number of years. If he makes over 95 per cent., free him for six years, over 90, five years, over 85, four years, over 80, three years, over 75, two years, and over 70, one year. The foregoing figures are suggested only ; they could be satisfactorily fixed by consulting the marks given on examination since January 1, 1893. It may be that in some portions of practical work officers cannot attain proficiency. The only way to do in such cases is to give them a second examination, and let them alone on that subject. It may be something not wholly

essential but desirable, map making for example. These matters can be settled only by the examinations for promotion in our army and thorough knowledge on other subjects will compensate for deficiency in one or two. Once well obtained these subjects are not lost, and the examination is practically no burden every six years. The object in introducing recitations in the subjects now laid down was probably so that we would keep in touch with these details of our profession, and the examinations are offered as a substitute for them, the writer believing that the object is, on the whole, a good one. If one twice makes 90 per cent. in guard manual, signalling and topography he could be freed from them. In drill regulations, field engineering, tactics, fire effects, regulations, and law, and hippology, and special examination for artillery, the examinations may well be kept up until an officer attains his captaincy, and after that time when they could be entirely practical excepting in law and regulations. After forty all examinations to cease excepting for promotion to captain and major. While men do not stop learning after forty, if they have not mastered these practical details of the profession before that they never will; that is, when opportunity has been given.

After the first two years' course, the work in winter could then consist of essays, lectures by those well qualified to give them, discussion of campaigns, of tactical questions, of practical matters of value to the service, of problems on the map of the vicinity, kriegspiel. Each spring and fall a lieutenant to be required to do at least a week's topographical work, unless expert, and more when he can be spared. Each year to be required to turn in at least one problem in field fortifications solved on the ground according to given conditions; at least once a month when weather permits officers to go out without troops and solve and discuss tactical questions on the ground and once each year turn in a solved tactical problem. This in addition to the work with troops, or if an officer is doing special duty at a post as adjutant, quartermaster or other duty, all but the tactical and engineering problem and tactical work without troops could be omitted. On this subject every line officer should be kept thinking. As is, I believe, generally the practice now, all officers should when they can be spared from their work attend the reading of essays.

It is more difficult to recommend a course for the lieutenants now in service. Without radical change it could be as now laid

down; so many subjects each winter with an examination on them in place of recitations. In summer the practical work in topography, engineering, etc. Perhaps many of the older lieutenants would not take kindly to the two weeks work in the former, feeling that it would do them little good. It could be made voluntary for all over thirty-five years of age. The introduction of a practical examination for promotion would be an incentive if it were required. Of course in tactics all in every grade would take part.

It is to be observed that in order to carry out this system little remains to be done excepting to make the course practical as regards topography, field engineering, security and information and other tactical work, enforce more rigidly the training of our men in fire discipline, and of both officers and men in looking out for themselves in the field, especially at our large eastern posts; to do away with the system of recitations, substituting therefor examinations; and to allow an officer to become proficient in these various details for six years.

It is a question whether these examinations can take the place of those for promotion by a central board. It would probably be advisable to keep up the latter for at least a few years. The examinations by these boards should be thoroughly practical in addition to the present theoretical ones, which are on a fair basis and well adapted to the testing of theoretical knowledge. When this more thorough examination was adopted officers were given fifteen months notification and the question of fairness in introducing practical work could be treated in the same way, and herein lies the power in Washington to enforce such work at posts. The boards are now authorized to introduce such work as they see fit, but it does not often extend beyond that laid down specifically, and probably in fairness should not, on account of the lack of opportunity officers have had. It would seem best to lay down pretty fully the scope of this work for examinations, and issue orders so that it would be carried out at posts with some uniformity, and it might be well, too, to prescribe or at least recommend certain sound methods. It would be impossible to carry out the practical examinations unless officers were detailed on the board known to be thoroughly familiar practically with the subjects, and it would seem best to detail officers specifically to examine into a certain subject or subjects, the whole board having power of revision, as now.

The following changes only in a few particulars the scope of the present theoretical examinations :

For promotion from 2d to 1st lieutenant.

Manual of Guard Duty. Written examination.

Military Law. Written examination. This now includes only Military Law proper. To include further "Instruction for the Government of the Armies of the United States in the field"; the "Law of War" and "Civil functions and relations of the Military," as now provided for captains. It is certain that in time of war all regular officers should be prepared on the first two omitted subjects; and in case of civil disorders they should understand thoroughly the last; it is much less than the course in law at the Academy.

Drill Regulations. Written and practical as now. The only addition desirable under this head is the introduction of more practical demonstration of a knowledge of fire discipline and instruction on varied ground. There should be throughout the army entire uniformity in the instruction in fire discipline, so far as essential principles and methods are concerned. It is really the drill of the company in extended order. This subject has become somewhat mixed in the service and is now scattered through three different books, the Drill book, Infantry Fire and Firing Regulations.

Art of War. Security and Information and Organization and Tactics. Written as now. In the first a practical examination through the solution of problems on maps.

Army Regulations. Written. To include much laid down in Troops in Campaign, administration and other essentials.

Effects of Fire. Written and practical problems on contour maps. The effects of the different kinds of fire, could, it seems to the writer, be treated in one book. Fire discipline is essentially a portion of drill, and much else in our present work on Infantry Fire comes entirely in the domain of tactics. The subject should not be treated too discursively and be for general use of all arms within the covers of a book about one-third to one-half the size of the present work on Infantry Fire.

Field Engineering. Written and practical, its scope being to demonstrate practical knowledge of how to make various revetting material and put them in place, selection on the ground of trace for hasty intrenchments for a field-work with computation of dimensions, strength of working parties, quantity of material

for revetment, probable time of construction ; problems of defilade, location of traverses, shelters, etc. ; construction of simple spar and trestle bridges ; making piers of casks, etc. In fact the same scope as now only practical. Some of this work could be done on maps but it would be better on the field.

Topography and reconnoissance. Written and practical. To make a road sketch of ten to fifteen miles in length, with a regular reconnoissance report, to be turned in before a given time at night. The examining officer should himself carefully prepare this work in advance to furnish himself a standard of comparison for that turned in. And it would be fairer to those examined to prepare this standard map with transit and stadia, not expecting of course at all the same degree of accuracy from the results of the sketching board. The examination should further extend to reading maps and oral explanations of the simpler instruments, construction of scales of pacing, gait of horse, scales of horizontal equivalents, etc. It is to be noted here that while the method of instruction recommended involves somewhat accurate contour work in connection with transit and stadia, the examination does not. It will be recalled that those instruments and the more accurate contouring resulting are used as a means of training only.

Signalling. Practical only.

For cavalry and artillery officers the special examinations as now laid down, and as practical as they can be made. For promotion from 1st lieutenant to captain, the same as above excepting as follows :

Omit Guard Manual as now. Also Signalling.

Topography. Entirely practical, if previous examination has been had, map reading and require officers to ride around a certain area of ground and make some sort of a map of it without instruments.

Field engineering, if previously had, entirely practical, having to do principally with the selection of trace and location of works.

The examination in the Art of War to be thorough and practical, solving on the ground problems in attack and defense of localities, giving formations suitable for accomplishing certain purposes. In fact a thorough examination in tactics and minor operations. Officers coming up for this examination are approaching forty and if they can ever understand this question it will, under a proper system, be at this age.

In law the same, with the addition of International and Constitutional law. These are not studied at the Academy for mental training as is much of the course in mathematics, but to be remembered. If one needs this knowledge at 25 he equally does at 40.

A written examination in the Principles of Strategy and Logistics.

In fact, this examination for promotion to a captaincy is the most important. It is taken at about the age of forty, and it would not be a bad plan to order up all officers for the mental part by or before this age. In our army, so small compared to our population, men at forty should be examined to see whether or not they are accomplished soldiers, and it is the best time to determine it. After this it would be safe to omit all mental examinations, excepting those in drill regulations and tactics. These change, and officers often after forty will not change their ideas accordingly.

It may be said that our service schools are the places to learn these details and accomplishments of the profession. It may be true so far as the artillery school at Fort Monroe is concerned, but the school at Fort Leavenworth cannot receive all infantry and cavalry officers. The question of the detail is largely a voluntary one, and many officers who would like to learn do not care to be subjected to school-boy methods. There is a great lack of mental homogeneousness in the material sent from regiments. Brainy men are given the same course as the mediocre and indifferent. There is so much good to be said of the school, and criticism is so much easier than creation, is so cheap and often so aimless that I criticise anything about the school with hesitation. But there is too much committing to memory of the language of the texts allowed if not actively encouraged. In fact, officers are given a better mark on examination for following the exact language. If one understands anything he does not need to resort to the words of another to explain it. The practice referred to often gives a mere booker the advantage over his intellectual superior, who has to spend his time committing exact language. It tends to keep the best men away. There should be some way of grading men without resorting to this means. I do not know that this is true of all the departments. While there is much practical work required of student officers there is not really much actual practical instruction, and too much recitation

from books. A large proportion of the practical work done there could be accomplished at posts. A large number of men who would not seek the detail at Fort Leavenworth would take up the text-books as earnestly as they do now for examination for promotion. If these examinations should be made more practical the incentive would exist to acquire the knowledge on the same basis. Indeed I am not sure that the majority need this incentive. Considering the fact that so much in the school is taught directly from text-books, and that mostly on this basis men are turned out for field work, it would seem that in view of the substantial foundation laid at West Point, officers could with some intelligent direction obtain somewhat the same results at their posts. In some cases better and in some worse. Some men will not or cannot learn even at a school and others will learn wherever they are with facilities and encouragement.

We could then have a War College where candidates would be required to pass an examination in most matter obtainable at posts, before being given the benefits of the course, which should be mostly by lecture, discussion and out-of-door work, largely without troops, in tactics, minor operations and some engineering. Also logistics and strategy, and perhaps some in international law. It should be a place to be sought by brainy men of all arms for the sake of coming in contact with others of like stamp, for the sake of the library, of other facilities and some direction of their efforts—not where they should be required to waste their time in memorizing the words of some one else, not where they will be subjected to school-boy methods of any kind. It is entirely feasible to bring about such a college within a few years. There is sufficient education, talent and ambition among our officers to make it a success. But such a school can never be founded on a system of recitations or memorizing. It will drive out the best element as a rule, or annoy it to death if it enters.

We now have the special courses at Willet's Point and at the arsenals, and they are of value. There is also the Cavalry and Light Artillery School at Fort Riley. It is difficult to see why any post cannot be a school as much as this. The method pursued the first few years at the Fort Leavenworth school was most valuable, viz.: assigning officers in turn to organizations of the three arms, cavalry, the light battery and infantry. A school based on this idea alone, to give lieutenants experience with the other arms for a year, no officers but the captains and field offi-

cers being permanently assigned, would be of great service. Lieutenants to be ordered there only after completing the practical course at their posts.

The question of instruction in colleges is one so intimately connected with the training of our officers that it seems necessary to consider its general aspect. It seems to the writer that the military course at our colleges should be as practical as it can be made, and deal hardly at all with text-books except at the purely military schools. Even at these the time of the boys is taken up largely with other educational matters. Of course there are a number of these schools where the course is based on that of West Point and is founded on much educational experience. The writer does not pretend to refer to these, but to the ordinary college detail, where comparatively little time is given. It may be said, however, that of all the military schools West Point can perhaps afford to be more theoretical and less practical than the others, as its graduates all go into the army, where there is abundant time for practical training, and where there should be abundant opportunity. Men going into civil life will carry with them comparatively little of the contents of text-books, of theories of the art of war, but simple military matters practically performed or illustrated become fixed in the mind. The course must depend upon the time the faculty allows, but the following is suggested as the subjects which should be taken up in order of their importance, omitting the remaining in case there is not time. 1. Time equally divided between close and extended order, the latter to be used mostly in inculcating so that they can never be lost during the coming years of civil pursuits the few and all important principles of fire discipline. 2. Company papers, guard duty, and castrametation. 3. A little target practice, if practicable. Some gallery practice could always be held if time permitted. 4. The subjects of advance guard, rear guard, outposts and patrol work; if time is limited, by lectures and practice on the ground, requiring with older student notes on the lectures and worked performed. Time allowed in winter could be employed by suitable black-board lectures, on map of country if it existed or could be made. 5. Practical work in making revetting material, hasty entrenchments, simple bridges, and crossing of streams, and camping expedients. 6. Characteristics of the three arms. 7. Lectures on tactical formations and manœuvres for older students. It would seem that these should be

always on the ground ; if there is opportunity to make the maps and furnish each student with a copy it would serve to make a more permanent impress on their minds. The following is merely suggested as the scope for three lectures. In each instance they would depend on the locality and judgment of the instructor. 1. Selection of trace for hasty entrenchments. These to be previously marked out by stakes on the ground, or by strips of red cloth on hedges, walls, etc. The lecture then to give the reasons why this trace is selected, how it should be defended and how attacked ; its probable relation with other parts of the field. Discussion and questions invited. All this should be as simple and untechnical as possible. 2. Preparation of a wood, village or group of farm buildings for defense, showing disposition of firing line, supports and reserves, the probable progress of attack and defense, under certain assumed conditions. 3. If near a large city a lecture could be given on the handling of mobs, the defense or guarding of railway stations or other buildings, keeping open lines of track, etc. Here it would often be difficult to give the entire lecture on the ground on account of the crowds, but it could be done on a map and with photographs or sketches after requiring the class to examine the ground.

Besides the above the following subjects could be taught to those taking various special courses in civil departments of the school. Military topography and reconnoissance to civil engineers, also a lecture or two on military engineering, and to these and to electrical and mechanical engineers lectures on the use of explosives, destruction and repair of bridges and railroads. Signalling for those taking practical course in telegraphy, and to those who wish to take the course. The matters under the first five headings are those which if taught pretty well, would remain with men for many years. None require high technical knowledge—nothing but practical training, a relief generally to the students from their books. The students could be supplied with some text-books for future reference, and copies of lectures with maps of the ground on which conducted.

Certain legislative changes to increase the efficiency of the service have been fully discussed within the past few years. The principal ones proposed are reorganizations of the artillery and infantry, and the consolidation of the staff departments. Important as they may be these questions do not intimately affect the instruction of line officers. It might simplify matters of training

to have all our recruits come in at a certain time of the year, but this does not seem at all a feasible matter to accomplish. The writer has heard a number of officers of high standing express themselves in favor of graduating all from West Point into the army instead of into a particular arm, the engineers corps to obtain its officers as does the Ordnance Corps now, and lieutenants to be assigned in turn to the various arms, and finally at a certain age or on attaining a certain grade, as that of captain, to take permanent place in the army. This would have two great advantages, obtaining finally officers better suited to the arm, and giving all abundant opportunity to become familiar with the three arms. The question is admissible of many arguments *pro* and *con*. The subject is worthy of extended discussion for which there is not space here.

The subject of the maintenance of a general staff in our small army is referred to above. This, too, is a subject worthy of more extended treatment. Perhaps the best way is to extend the training of the *seemingly* most capable officers in an advanced War College. Even in the large armies of the world the element of chance enters largely in finding the men most fitted for high commands. It is peculiarly so with us. It would have been perhaps highly disastrous to have had the rise of Grant, Sherman and Sheridan regulated by a general staff, and conditions affecting this are but little changed now from those existing then. As high training for as many officers as possible to aid those who develop genius without the power to smother it, would seem the system best adapted for us.

No man, no body of men, no community, can stand still. It improves or retrogrades. There is little fear of the latter in our army; there is vigor and intelligence enough, and all they need is to be directed somewhat into proper channels—into practical work, enough to cultivate desirable faculties without attempting to press all into the same mould.

The army is and should be looked upon as a training school, but too much should not be attempted by a system, especially where as with our army its exact employment in time of war cannot be foreseen. It is to be expected that most officers will in some directions go beyond the requirements of any scheme adopted. Many of these may through lack of natural talent be somewhat weak in portions of that prescribed, and make up for it in other directions. The writer has attempted to draw up a

system which will cultivate generally in our officers what seem to him the qualifications most necessary for American officers under existing conditions, and does not mean to infer that what it prescribes is all an officer should know. While criticising many existing methods, it is through no lack of respect for the ability and high character existing in all grades, but through a desire to see those attributes made the most of, to see the army under new conditions of increased population, wealth and culture be as worthy of the respect and admiration of our people as it always has shown itself in the emergencies of the past. No change in our system of instruction will create great commanders, but it can give a larger body of highly useful men, of practical, ready men, equipped in peace to train the youth of our country, and in war to throw whatever powers they may have into the mighty task of helping to organize, train, discipline, take care of and lead the raw but brave forces to compose our armies. This is the true mission of our officers. May narrow formulas never make it to be anything else.

THE PRESENT STATUS OF FIELD ARTILLERY.

BY FIRST LIEUT. H. C. CARBAUGH, 5TH U. S. ARTILLERY.

BY field artillery is meant, in this paper, the guns with their complement of artillerymen organized and equipped to manœuvre, and to act in concert with other troops in the field.

Field artillery does not include siege and position guns solely intended for use in attacking or in defending positions thoroughly fortified beforehand, but it may now be fairly said to include mountain artillery, horse artillery, ordinary light and heavy field artillery and organized mobile batteries of field howitzers and field mortars for high angle fire.

This extension of meaning of the term field artillery seems to be justified by changes and additions, hereinafter mentioned, which nations with tactically organized armies have made, or contemplate making, in adopting a diversified and special field armament intended to solve the varied problems which field artillery now meets and to overcome the difficulties presented by a modern battle-field.

MOUNTAIN ARTILLERY.

On principle it may be said that a mountain gun should not be made of more than two parts, and that neither part should weigh over 200 lbs. so as not to exceed in connection with the carrying saddle and harness the transporting power of a mule, which is limited to about 325 or 350 lbs. Lightness is therefore essential while the greatest power possible is sought.

The accompanying table (I) gives details of the guns, the ammunition and the carriages now used for mountain artillery by the nations mentioned. Examining this table it will be noticed that the present models of guns have been in use for quite a long time. The most probable change will be in the English model, as that nation is not quite satisfied with muzzle loading, and furthermore an English firm has manufactured a more powerful B. L. mountain gun weighing 416 lbs.—the breech portion weighs 209 lbs. and the muzzle portion, including the trunnion ring, 207 lbs.

TABLE I. MOUNTAIN ARTILLERY.

	Austria 1875	England 1879	France 1878	Italy 1883	Russia 1883	Spain 1874	Switzerland 1877	United States Hotchkiss
Name of gun.....	B. L., 7 cm. Steel bronze	M. L., 2", 5 Steel, in two parts	B. L., 8 cm. Steel	B. L., 7 cm. Compressed bronze	B. L., 2", 5 Steel	B. L., 8 cm. Steel	B. L., 75 mm	B. L., 12 pr. Steel
Weight in pounds.....	197	400	231.5	216	194	224	203	218
Calibre, inches.....	2.6	2.5	3.15	2.9	2.5	3.08	2.55	2.99
Lengths { total, inches.....	39.36	70.45	47.28	39.37	39.76	37	37.91	45.6
Lengths { bore, ".....	32.88	66.5	41.7	35	.....	33	.....	39
Twist, in calibres.....	10	8 to 80	10	12	20 to 20	12	.....	10
Number of grooves.....	18	8	24	.....	20	12	.....	24
Breech mechanism.....	Prismatic wedge	Muzzle loader	De Bange Copper driv- ing ring	Krupp Copper driv- ing ring	Cylindrical bis. wedge Copper bands	Plascencia, inter. screw Lead coating	Wedge, Broadwell ring	Sliding wedge
Means of rotating projectile.....	Copper rings	Gas check	Copper driv- ing ring	Copper driv- ing ring	Copper bands	Lead coating	Rotating band	Rotating band
Vent.....	Vertical	Radial	Axi l	Vertical	Axial	Axial	Diag'l then Axial	Diagonal then Axial
Service charge gunpowder, pounds.....	0.77	1.625 (Ring)	0.881	0.625	0.423 0.846	0.875	0.88	0.7 I. K. 0.9 Dupont
Common shell { weight, bursting charge, oz.	6.34	7.625	13.875	9.375	8.8	8.25	9.48	12
Weight, pounds.....	3.34	4	1.5	4.9	4.374	7	3.52	6.3
Shrapnel { bursting charge, oz.	7.02	7.8125	14.3	9.7	8.9	10.01	10.14	12
Number bullets.....	1.31	0.5	2.8	0.010	0.736	0.002	1.94	1.75
Muzzle velocity, f. s.	65	100 + 21 fragments	120 + 42 segments	105	100	90	112	160. Can has 125 bul.
Shrapnel effective { Range, yards.....	978.7	1440 (Max.)	840	840	893 902	918	892	870
elevation.....	2083	4300	4050	2850	4590	2075	3680	1298
	7° 58'	.....	27° 54'	.....	28° 21'	.....	20° (Max.)	4000
							4990	14° 35'
Gun carriage, { without wheels.....	150	324	322	198	325	240	205	220
weight, { complete with gun.....	440	939	661	551	683 horse	584	573	453
Number of rounds per { gun.....	32	96	70	24	96	100	20	78
battery.....	448	864	840	444	1536	600	600	32 in limber
" animals per battery.....	67	220	94 (150 Alg'rs)	148	206	81	83	*Req. Animals: 1, gun and wheeler: 1, car, pole, six rounds: 1, ammunition.
" guns " ".....	4	6	6	6	8	6	6	4 In transportation by pack animals, 1 gun mule, 1 carriage mule, 1 accessory mule, 1 pack mule, 1 ammun. mules are required.
" personnel per battery.....	111	287	160 (240 Alg'rs)	286	306	197	170	

TABLE II. HORSE ARTILLERY.

Description	Austria-Hungary	England	France	Germany	Russia	Spain	Italy	United States
	Horse artillery 8 cm., 1875	Horse artillery 12 pdr. (6 cwt.)	Horse artillery 8 cm.	Light field C/73/88	Horse artillery	Horse artillery 8 cm.	Field & horse artillery, 7 cm.	Light field artillery, 7 cm. 3.2 B. L. R.
Gun { material weight, pounds..... calibre, inches..... total length, inches..... bore length, "..... breach mechanism..	Steel bronze	Steel	Steel	Steel	Steel	Steel	Compressed bronze	Steel.
	657.5	672	936.00	926.00	805.00	628.00	609.00	795.00
	2.95	3.00	3.15	3.46	3.425	3.09	2.90	3.2
	76.77	66.75	89.76	82.68	66.93	87.21	71.10	87
Gun { weight, pounds..... height, in..... wheels { track, in.....	70.56	59.00	82.20	73.44	57.67	Interrupted screw, steel ring	62.56	Interrupted screw
	Prismatic wedge	Interrupted screw and pad obutator	De Lange	Cylindro prismatic wedge	Cylindro prismatic wedge	.....	Krupp	.....
	1102	1256	1102	1113	992	628	809	1197 with equipment
	54	60	56.3	55.1	54.9	52	49.6	57.75
Gun { weight, pounds..... height, in..... wheels { track, in.....	60.2	62	56.3	60.2	61.1	54.1	53.8	.....
	1103	1221	926	1080	1152	1426	1088	1031
	1764	1	1411	1973	1792	2050	1687	1768
	3582	4005	3516	4078	.....	3397	3394	3760 *
Gun { weight, pounds..... height, in..... wheels { track, in.....	1213	1170	1400	1235	926	1500	1160	2349
	4624	3900	3990	4387	3542	4186	3567	4499

Service charge, lbs. (powder)	2.1	Cordite, 12 1/2 ounces	3.31	3.3 (1.41 smokeless)	3.08	3.4	1.9	3.50 spher. hex.
	1386	1550	1608	1450 shell 1375 shrapnel	1351.7	1509	1416	1685

Muzzle velocity, f. s.	9.51	.....	None	15.5	15.23	13.89	9.56	13.5 +
	.....	.....	None	7.2	7.2	10.58	4.9	7

Bursting charge, oz.	10.51	12.5	13.5	17.78	15.59	.....	9.4	13.5

Bursting charge, oz.	1.7	1.5	2.1	0.793	2.2	.....	0.46	2.75

Number of bullets	105	156	120 bullets + 40 segments	262	165	.....	105	201 fragments and bullets

* With new 16.5 lb. shrapnel I. V. is now 1490, and 240 fragments and bullets.

† With new 16.5 lb. shrapnel I. V. is now 1490, and 240 fragments and bullets.

TABLE II. HORSE ARTILLERY.—Continued.

	Austria-Hungary	England	France	Germany	Russia	Spain	Italy	United States
Description.	Horse artillery 8 cm., 1875	Horse artillery 12 pdr. (6 cwt.)	Horse artillery 8 cm.	Light field C/73/88	Horse artillery	Horse artillery 8 cm.	Field & horse artillery, 7 cm.	Light field 3.2 B. L. R.
Number of rounds on one gun and limber wagon.	40	38	30	32	23	36	44	42
Per battery.	112	72	90	82	55	72	104	126
Number of wagons.	6	660	990	848	798	648	888	1080 to 1386
			9	8	12	6	6	.....
Number of horses { per gun.....	6	6	6	6	6	6	6	6
" wagon	6	6	6	6	6	6	6	6
" battery.....	215	183	214	230	242	.....	175	144 149
Number of personnel per gun.	183	182	187 to 189	168	210	.....	154	180
Number of wheeled carriages.	6	6	6	6	6	6	6	6
Effective range, shrapnel, yds.	19	16	18	20	30	.....	17	17
" " elevation	3750	4000 (Max.)	6340 (Max.)	3770	3830	.....	3380	4500
Rifling, twist in, calibres.	10°. 37	.....	17°. 29	10°. 1	.....	.....	14°. 6	11°. 5
Number of grooves in gun.	24	18 to 18 1/2	24	24	24	.....	12	24
Means of rotating projectile.	.....	Copper driving band	Copper driving ring	Two copper rings	Copper bands	.....	Copper driving ring	Copper band
Kind of vent.	.....	Axial, with T-head	Axial.	Oblique through wedge	Oblique through wedge	.....	Vertical	Axial

NOTE.—In Austria the 9 cm. gun will probably be used for horse artillery, weight about 901 lbs. This gun is almost identical with the 9 cm. field-gun, though shorter. The English gun and limber loader probably weighs 3883 lbs.
There is doubt as to the weights given for the carriage and limber of the Spanish gun, the new 8 cm. steel field-gun will be used for horse artillery.
The Italian gun with lighter limber is used as a light field-gun.
The shrapnel of the French gun cannot be effective at 6340 yds., for the shrapnel of the U. S. 3 1/2 gun has a remaining velocity of only 690 ft. at 4500 yds., a better result than the French gun can give.

TABLE III. FIELD ARTILLERY.

Description.....	Austria-Hungary Field Art. 9 cm., 1875	England 15 pr. B.L. 7 cwt.	France Field 9 cm.	Germany		Russia		Spain		Italy Field 9 cm.	United States Heavy field 3.6 B. L.
				Heavy field, c. 73	New field, C/73/91	Light field	New light field, 1892	Field 8 cm.	Heavy field 9 cm.		
Gun { material weight, pounds. calibre, inches. length, total in. length, bore, in. breech mech. }	Steel 1072	Steel 784	Steel 1168	Steel 992	Nickel steel 970	Steel 1003	Steel 968	Steel 963	Steel 1064	Compr's'd bronze 1037	Steel 1181
	3.42	3	3.54	3.46	3.46	3.425	3.425	3.09	3.29	3.4	3.6
	81.10	92.35	89.76	82.68	82.68	82.7	81.828	75.46	81.10	82.6	93.48
	74	84	81.25	73.44	73.44	73.42	66.188	72.99	74.01	73.86	84.60
Gun { weight, pounds. " wheels { hgt., in. " track, "	Prismatic ruptured screw obturator	Inter- rupted screw obturator	De Bange	Cylindro prismatic wedge	Cylindro prismatic wedge	Cylindro prismatic wedge	inter. De Bange obturator	Krupp	Krupp	Krupp	Inter- rupted screw
	1268	1256	1456	1202	.....	1111	.....	941	1257	1234	1331
Weight of in pounds limber, empty " loaded gun & lim. loaded am. wag., body am. wagon and limber loaded.	54	60	58.7	55.1	.....	54.9	.....	52	54.7	56.7	57.75
	60.2	62	60	60.2	.....	61.4	.....	55.1	64.2	66.6	.....
Service charge, pounds..	905	1221	1119	1201	.....	1065	.....	908	1345	1098	1031
	1918	1786	1786	2016	.....	2028	.....	1365	2227	1907	2648
Muzzle velocity, f. s.	4091	4586	4586	4365	4411	4222	.....	4377	4244	4244	4860
	1170	1455	1455	1516	.....	1207	.....	1191	1585	1422	2349
Shell, common, (full) lbs.	3300	4795	4795	4896	.....	4475	.....	3075	4495	4672	5407
	4-powder or 15 1/2 oz Cordite	4.53	Smoke- less 1.41	Smoke- less 1.41	Smoke- less 1.41	.....	.....	2.2	3.06	3.3	4.1875
Bursting charge, oz.	1471	1492	1492	1375	High ex. 1450	1450	1450	1493	1551	1490	1550
	13.99	.....	.....	15.5	15.5	15.23	15.23	10.2	13.88	14.58	.....
Shrapnel, (full) lbs.	7.57	.....	.....	7.76	High ex. 15.5	7.2	7.2	8.8	8.8	7	.....
	15.74	14	10.12	17.78	.....	15.59	15.59	9.6	13.23	14.45	20
Number of bullets,	3.19	1.5	4.5	.793	.....	2.2	2.2	0.35	.....	0.6	14.5
	165	235	160+77 segments	262	300	165	165	90	92	177	218+62 fragments

TABLE III. FIELD ARTILLERY.—Continued.

[illegible]

NOTE.—In England the number of rounds given was that used for the 12 pr. gun. France formerly had an 18 lb. shell containing 7.06 oz. bursting charge. The new light Russian field-gun is to be used also for horse artillery. For this gun, for field service, the initial velocity is to be increased about 325 f. s.; the shell to have greater number of bullets and to be of steel; the carriage to be new with strong recoil devices; and to be capable of firing at $4\frac{1}{2}$ aimed shots per minute. The marked difference between total length and bore length of the Russian 4.23 and new 3"-45 appears incorrect.

TABLE IV. ORGANIZED FIELD ARTILLERY.

	No. of Batteries		No. of Guns per battery		No. of Officers		No. of Men		No. of Battery Horses		
	Peace	War	Peace	War	Peace	War	Peace	War	Peace	War	
*Austria-Hungary.											
Horse artillery	16	.....	6	6	5	5	122	187	105	218
Field artillery	224	.....	4	8	4	5	101	195	39	136
Mountain artillery	14	.....	4	4	4	3	86	101	20	53
†Belgium.											
Horse artillery	4	4	6	6	4	5 or 7	107	183 } 180 }	.....	.....
Field artillery	30	30	6	6	4	5	86	166	.....	.....
‡England.											
Horse artillery	5 } 16 } 32 } 55 }	.....	4 } 6 } 4 } 6 }	6 } 6 } 6 } 6 }	4 } 5 } 4 } 5 }	5 } 5 } 5 } 5 }	136 } 162 } 136 } 101 }	179 } 179 } 170 } 170 }	.....	.....
Field artillery .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mountain artillery	9	.....	6	6	5	5	106	152 } to } 208 }	.....	.....
France.											
Horse artillery	52	.....	6	6	5	4	105	185	87	212
Field artillery	421	.....	6	6	5	4	103	190	61	156
“ “ African	4	.....	6	6	4	4	153	190	134	156
Mountain artillery	10	.....	6	6	5	4	103	195	19 } 42 }	34 } 66 }
“ “ Alpine	13	.....	6	6	5	4	155	196	16 } 80 }	34 } 66 }
“ “ African	8	.....	6	6	4	4	238	248	27 } 140 }	27 } 140 }
Germany.											
Horse artillery { low	23	.....	4	6	4	5	91	170	76	.....
medium	4	.....	6	6	.....	.....	to		to	.....
high	20	.....	6	6	.....	.....	120		120	.....
Field artillery { low	182	.....	4	6	{ 4	5	107	170	44	.....
medium	214	6	6					to	to
high	57					120	75
Holland.											
Horse artillery	2	.....	.....	.....	4	.....	65	166	127	180
Field artillery	18	.....	6	.....	4	.....	65	161	.....	70
Italy.											
Horse artillery	6	.....	6	.....	4	4	120	150	.....	.....
Field artillery	186	.....	6	.....	3	4	90	124 } 162 }	.....	.....
Mountain artillery	15	.....	6	.....	4	6	140	280	.....	.....
Russia.											
Horse artillery	48	.....	6	.....	5	5	173	198	.....	.....
Field artillery, light	215	.....	4	8	6	6	179	227	.....	.....
“ “ heavy	112	.....	4	8	6	6	207	259	.....	.....
Mountain artillery	21	.....	4	8	6	6	149	300	.....	.....
“ “ (horse)	2	.....	6	6	.....	.....	.....	.....	.....	.....
Field mortars	26	.....	6	6	5	.....	175	226	.....	.....

*On mobilization 56 field, 16 mountain and 4 narrow gauge batteries may be added. Actually in time of peace there are only 92 men and 42 horses in a field battery, except in 3 batteries where there are 124 men and 70 horses. The mountain batteries of the corps artillery have an addition of 9 privates and 18 horses each.

†These are in addition to reserve batteries and 4 depot batteries.

‡In addition there is a depot battery each of horse, field and mountain artillery. There are 10 horse batteries, 46 field batteries and the three depot batteries serving in England, the others in India save one mountain battery in South Africa.

This gun fires a 15-lb. projectile—common shell, shrapnel or case. The shrapnel contains 232 bullets and is given 1200 f. s. muzzle velocity. The objection heretofore urged against the gun is that the weight of the projectile reduces the number of available rounds to about one-half per mule as compared with the number now carried for the present 2.5" muzzle-loading gun. It is thought, however, that the number of mules used for transportation of ammunition could be increased from 6 to 10 and thereby provide 80 rounds of ammunition per gun as against the 96 now carried by the six mules used,—and that this difficulty of increased transportation would be more than counterbalanced by the destructive effect of the 15-lb. projectile. These arguments may not prove unacceptable to the English and result in their adopting a mountain gun with ammunition interchangeable with their present field-gun, which fires a 14-lb. projectile.

It is stated by good authority that the Austrians now have a 2.75" mountain gun, of divisible model, 1885, weighing 420 lbs. The De Bange mountain gun of the French is an excellent gun, requiring four mules for transportation against five for the English jointed gun. This gun, whose projectile has great initial energy and retains satisfactory velocities at fighting distances, satisfies almost perfectly the conditions of maximum effectiveness and facility of transportation of mountain artillery and may be considered a typical mountain gun. It has been closely followed by the Mexican government, whose mountain gun is made of steel and on the De Bange system.

HORSE ARTILLERY.

The most recent changes in matériel for horse artillery is that begun in Austria in 1894 by arming it with a 3.42" gun almost identical with their new field-gun of that calibre, save that it is shorter, weighs 170 lbs. less, and is provided with a lighter brake and has no axle seats.

This change amounts to a practical conclusion by the Austrians that the horse-artillery gun should have the same power and effect as that of the ordinary field-gun, and should depend for its extra mobility on its gun detachment being mounted. If this does not give sufficient mobility it would be better to add an extra team, even if two of the cannoneers are mounted on off leaders or on the limber chest, than to sacrifice power of the gun.

Horse artillery must be able to accompany cavalry in exploring for the enemy, as well as in other special duties, and to support it in its stationary actions, but above all, horse artillery must be able to take its place with other field artillery in line of battle in fighting to gain victory—a duty which requires a gun of the same calibre and power as ordinary field artillery whereby ranging and ammunition supply is simplified, and repairs on the battle-field facilitated. This view may seem to rule out the use of horse artillery to support cavalry in its attack on cavalry and to hold itself in constant readiness during battle for supporting cavalry in the latter's hoped-for phase of battle whereby cavalry masses will apparently decide the action. It must be remembered, however, that horse artillery has work to do while cavalry is awaiting opportunities, and that its use in supporting cavalry is only incidental. In examining the table it is noticed that Germany has no gun distinctively known as a horse-artillery gun. The light field-gun has therefore been given as the horse-artillery gun, but as the total weight of the new field-gun, model 1891, with 32 rounds of ammunition per limber is undoubtedly less than the light field-gun with the same number of rounds it is not unlikely that the '91 gun will be the future armament of their horse artillery.

The light field-gun of the U. S. (795 lbs.) appears from table II to be the best horse artillery gun extant, as even its 13.5 lb. shrapnel furnishes over 200 bullets and fragments, while the draught per horse with 42 rounds per limber is only 626 lbs.—a combination unequalled for power and mobility by any other nation's horse artillery, and rendered more effective by use of the new shrapnel and smokeless powder.

FIELD ARTILLERY.

Turning to field artillery proper and leaving out of consideration the heavy Russian 4.2" gun and the U. S. 3.6" gun it is found by the table (III) of field artillery that the field-gun of France is heavier than that of any other nation and that it fires a heavier projectile, so that the weight per horse behind the team is 765 lbs. or about 40 lbs. per horse more than the maximum to insure sufficient mobility. Maximum projectile effect coupled with sufficient battery mobility is the end toward which field equipment has tended and the results obtained have been reached through use of guns of less than 1000 lbs. weight firing projectiles relatively heavy with lower muzzle velocity.

Thus for the light 3.2" field-gun of the U. S. the shrapnel has been changed from 13.5 lbs. to 16.5 lbs. and the muzzle velocity reduced from about 1685 to 1450 f. s. A similar change has been made by Germany. Russia however is expecting to secure higher remaining velocity by about 100 metres, made possible by strong recoil checks and by use of a rear bursting charge in the shrapnel. The 3.2" gun of the U. S. can stand a higher velocity than 1450 f. s., probably up to 1600 f. s. if recoil be controlled. General Rohm of the German Artillery describes as his idea of a model field-gun "a 3.2" gun firing a 15.1 lb. shrapnel with an initial velocity of 1575 f. s. He gives this as a mean between the limits he fixes of a 16.5 lb. projectile with an initial velocity of 1640 f. s. and a 14.15 lb. projectile with an initial velocity of 1840 f. s. with weight of gun at 924 lbs. Consequently our 3.2", by proper control of recoil and by improvement in arrangements for laying with perhaps a slight addition of weight might very well be selected as a model field-gun. At present the recoil and jump of the carriage is about 11 feet with brakes on—a serious trouble and one which would soon tire out cannoneers and render prolonged firing and readiness to fire very difficult. Assembling in one table the data, from the tables of horse artillery and field artillery, as to calibre, weight of shell, weight of shrapnel, initial velocity, number of bullets in shrapnel, and load per horse, we have the following direct comparison of guns of certain nations. (See table on page 510.)

RAPID OR QUICK-FIRE FIELD-GUNS.

During the past two years there has been made marked advancement in the development of rapid or quick-fire guns with suitable mounts for field-artillery. The earlier idea was to develop a quick-fire field-gun, using a light projectile, and firing several shots without being relaid, but this end is no longer sought. Experiences of manufacturers have demonstrated that only with relatively very small calibres can recoil be absorbed within manageable limits, and as a very slight movement in recoil or in jump of the carriage is fatal to accuracy of fire in the succeeding shot as an unaimed one, the idea that a quick-fire field-gun need not be relaid before each shot has been abandoned as impractical.

It has also been thought that protection of gun detachments by steel shields from small-arms fire might enable guns to come into action at from 1000 to 1500 yards, whereby a rapid-fire gun and mount could be devised for low initial velocities of projec-

NATIONS.	FIELD ARTILLERY.						HORSE ARTILLERY.					
	Calibre.	Weight of Shell.	Weight of Shrapnel.	Initial Velocity.	Load per Horse.	Inlimber No. of Rounds.	No. of Shrapnel Bullets.	Calibre.	Weight of Shell.	Weight of Shrapnel.	Initial Velocity.	Load per Horse.
	inches.	lbs.	lbs.	f. s.	lbs.			inches.	lbs.	lbs.	f. s.	lbs.
Austria.....	3.42	13.99	15.74	1471	735	32	165	2.95	9.51	10.51	1386	594
Engla' d.....	3.00	....	14.00	1550	694	38	235 with frag-ments.	3.00	....	12.5	1550	647
France.....	3.54	....	19.12	1492	764	27	237	3.15	....	13.5	1608	576
Italy.....	3.4	14.58	14.90	1458	708	36	177	2.9	9.56	9.4	1416	586
Germany (new)....	3.46	15.5	15.5	1450 (1800)	734	32	300	3.46	15.5	17.78	1375	564
Russia { Light....	3.42	15.23	15.59	1450	696	30	165	3.42	15.23	15.59	1351	596
{ Heavy....	4.23	27.64	28.13	1227	794	18	340					
Spain	3.29	13.85	13.23	1551	730	33	92 frag-ments.	3.09	13.89	....	1509	566
United { Light....	3.2	13.5	13.5	1685	626		208				1685	626
States { Heavy....	3.6	....	16.5	1450	653	42	240	3.2	13.5	10.5	1450	653
			20	1550	810	42	240					

tiles so as to enable a quick ascendancy over a slow-firing, longer range, high-powered opponent. It must be remembered, however, that the gun detachment does not begin its work until after the halt is made for coming into action, and that an advanced skirmish line can bring the artillery to a halt before this degree of proximity to the enemy's artillery has been reached, as was done at St. Privat when the 3000 Chassepôts of the French skirmish line brought Prince Kraft's 54 guns to a halt at about 2500 to 3000 yards from the line to which the French artillery had withdrawn, thereby completely changing that commander's oft repeated views as to the practicability of coming into action at short range, stopping his efforts at that time to close, and causing him then and there to vio-

late his general orders to go into action at 1800 paces or closer.

The artilleryman must have the ability to reach his opponent at long ranges with a projectile of powerful effect, combined with reduced labor for gun detachment, with greatest possible readiness to fire and with suitable draught load per horse to insure sufficient mobility. These conditions must be fulfilled by a quick-fire field-gun and mount, and they have been sought through control of recoil and jump of carriage, through simultaneous laying and loading and through use of fixed ammunition.

It is reported by good authority that about March 11, 1896, the future quick-fire cannon for the field artillery of France was tested at Bourges—a 2.95" gun firing a projectile weighing about 14.3 lbs. Private manufacturers have reached good results. The Maxim-Nordenfellt Company have for field artillery a 2.95" quick-fire gun throwing with 1600 f. s. initial velocity a 13-lb. projectile at a draught of 661 lbs. per horse, with 36 rounds of ammunition in the limber, also one firing a 11 $\frac{3}{4}$ -lb. projectile with a draught of 551 lbs. per horse for horse artillery with 42 rounds in the limber. These guns use fixed ammunition, have hydraulic brakes for absorbing part of the recoil and reducing the "jump" of carriage, have automatic brakes on the wheels and carry a light steel shield to protect the "laying number" from small-arm bullets.

Krupp has a 2.95" quick-firing field-gun firing a 14.3-lb. projectile (by highly trained cannoneers) at the rate of from 5 to 6 shots per minute. There is required only slight adjustment of aim for subsequent shots but no running up after firing is necessary.

Russia, actuated by economy and desire for simplicity, has retained the former 3.42" field-gun on a remodelled carriage so as to fire, as is claimed, a 15.23 lb. projectile at the rate of 4 $\frac{1}{2}$ aimed shots per minute. They rely on a trail spade to check recoil and have moved the sights forward on the gun so as to permit simultaneous laying and loading.

There still remains considerable prejudice against fixed ammunition due to dead weight of metallic cartridge case, to danger of ammunition being jammed so as not to function in the gun, and to possibility of premature explosions. In our service efforts to develop a light case of aluminum or aluminum alloy have about been abandoned and a model for a brass case weighing 2 $\frac{1}{2}$ lbs. fixed upon for the 3.2" field-gun, but its use is not settled upon as experiments are being conducted with the hope of developing a non-

metallic waterproof case. Retention of simplicity with control of recoil and jump of carriage, combined with simultaneous laying and loading would even without the use of fixed ammunition result in an ideal quick-fire artillery field weapon. It has almost been accomplished and it is safe to say that it is necessary and that nothing less will satisfy the artilleryman. When without confusion 4 or 5 shots of from 15 to 16 lbs. weight with an initial velocity of 1600 or 1500 f. s. can be fired per minute, reduction of number of guns per battery will follow, resulting in an increased number of ammunition wagons per battery and greater all round efficiency.

HIGH ANGLE FIRE IN FIELD ARTILLERY.

The use of field howitzers or field mortars for high angle fire appears to be necessary from the fact that of the artillery phases of battle, namely, beginning the action, the artillery duel, preparing the way for the infantry attack, supporting the infantry advance, and aiding in pursuit or retreat, that of preparing the way for the infantry attack is the one which must be well done if the battle is to be won, and the one which requires effects and not mobility.

It being a principle that a front attack by infantry against unshaken infantry is impossible, there is necessity for a complete preparation of the way by artillery, in fact, a complete battering of the defense not only along the line or point of assault but to its rear over ground occupied by troops in reserve, before such an attack can be possible. When therefore the line or point of attack includes obstacles, such as earthworks, fortified villages, etc., special preparation becomes imperative. In case of villages the ordinary field-gun can be trusted to do the work as was done by 88 guns directed against the village of Marie-aux-Chiens, in the battle of Gravelotte. The penalty for failing to make this preparation is also illustrated in the same battle by the experiences of the Guard in its attack on the village of St. Privat.

The protest made by the commanding officer of that part of the Guard ordered to advance—attested by Prince Kraft's evidence—that the way had not yet been prepared is quite sufficient to show that, although there had been slow and prolonged firing along that part of the line, proper preparation had not yet been undertaken. The protest had to go unheeded because a detached portion of the Guard had already begun the advance.

Can proper preparation of the way for infantry advance be

made in a reasonable time by ordinary field artillery firing ordinary shell, shrapnel, or even small charges of high explosive where the obstacles include earthworks? The practical answer to this question has been the introduction of field howitzers and field mortars, organized into mobile batteries, and the evident intention, especially by Germany, to use foot artillery with heavy howitzers in line of battle by European nations.

France has adopted a 4.7" inch howitzer firing either a steel shell weighing 44.88 lbs., containing 13.22 lbs. of melinite, or a shrapnel of the same weight containing 630 bullets, giving with a maximum initial velocity of 950 f.s. a range of about 5000 yards with angle of descent of 30°. The draught per horse is about 868 lbs. Each gun is provided with 288 rounds of shrapnel and 240 rounds of melinite shell. Each battery consists of six guns and the necessary ammunition and store wagons and is drilled and fought as field artillery.

"The intended effect of howitzer shell is the destruction of earthworks against which the melinite shell of the 3.54" field-gun is considered to be of too little value. The demolition of an earth parapet 9.8 feet in thickness and 7.5 feet high requires, for instance, ten good hits per metre, with 3.54" shells, which would result in an enormous expenditure of ammunition against a fortified position. A fair hit with a 4.7" shell has the same effect, and it may be asserted that it always equals the effect of any 12 shells of the same calibre filled with ordinary powder. Against troops behind thin walls or cover of similar kind the shell acts after penetration of the obstacle, by its scattering débris. Under such conditions the fact of the air pressure produced by the exploding projectile being able to throw down living beings, and to cause them severe internal injuries, is also taken into account together with the destructive agency of splinters. If the explosion occurs in a closed room, after penetration, all the occupants are killed either by the flying pieces or by atmospheric pressure. * * * Its high complement of shrapnel (55 per cent.) points to the intention that it (the howitzer) is also to be used to take part in the artillery fight proper."

Germany has recently adopted for the foot artillery a new 5.9" howitzer drawn by four horses to be used against "large targets under cover as, for example, troops assembled behind villages, woods, undulations of the ground and other obstacles obstructing the view and against hasty fortifications and even

permanent fortifications at great distances." It is reported that a 4.7" field howitzer is to be tried. Russia and France previously have adopted field mortars with which to effect these objects. Austria has recently abandoned them and together with Germany expects to use high explosive shell from the field-gun against the point of assault. Turkey and Brazil have also adopted howitzers, while England contemplates establishing, in addition to her heavy field and howitzer batteries in India, two heavy field batteries, at home, armed with 4.7" or 5" howitzers. Can men sitting immediately behind cover be effectively reached by any kind of fire? Certainly infantry and infantry fire are ineffective to shake them. High explosive shell and common shell from flat trajectory field-guns would require very accurate firing against a small vertical target. The firing of shrapnel would keep down the fire of men so concealed, but the approach of one's own infantry would require the abandonment of such fire and leave the enemy unshaken at close range. A general in command should have a reserve power which carries moral and physical force of a decisive nature and which would enable him to break the enemy's line when once the fight has sufficiently developed to indicate to him the desirable point of attack, consequently large projectiles filled with great bursting charges of powder or high explosives and fired with reduced charges present themselves as a more rapid means to the end sought. Mortars are inadequate through lack of accuracy in range to fire these projectiles. A longer gun is necessary. Our 3.6" heavy field-gun is noticeably inferior to the Russian 4.23" heavy field-gun in projectile effect. Taking into consideration that Russian experiments showed their 4.23" gun was only about half as effective as their 6" field mortar, and that our 3.2" field-gun with a 16.5-lb. shrapnel has enough power to settle combats where animate objects are in view, that our 3.6 field mortar fires a small projectile, very inaccurate as to range, it seems to follow that the U. S. 3.6" field-gun and the 3.6" field mortar should be replaced by a 5 inch howitzer firing projectiles,—both shell and shrapnel,—weighing about 50 lbs.

ORGANIZATION AND ARMAMENT OF FIELD ARTILLERY.

In field artillery proper the battery is the fire unit and the battalion of three or four batteries the tactical unit that is the manœuvring and fighting unit.

Formerly a single gun was considered the unit of fire and the battery the tactical unit, but now the battery commander has been relieved of giving his attention to the tactical situation by the battalion commander, who in addition selects and reconnoitres positions, designates objectives, controls the rate of fire, and keeps in touch with the commanding officers of the troops with which he is serving.

These changes have been brought about by the facts that the guns have become accurate and uniform in shooting quality, that a single battery is too weak to perform alone the work required of it on a modern battle-field, that the number of guns employed is very great and that it is necessary for the artillery to act in masses. A fundamental principle which determines the amount of artillery organized in peace is that there should be in existence as many batteries as the nation would ordinarily need, when its tactically organized armies are placed on a war footing.

Economy during peace usually causes a reduced number of guns and men in a battery—an allowable reduction as expansion of an already existing unit is practicable, especially where all required matériel and equipment are in store, but creation of efficient new units is not possible within the time available between call for mobilization and conflict.

The amount of organized field artillery in the armies of the principal nations, with battery organization and strength is given in table IV.

The war strength of a field battery, proper, in Austria and Russia is 8 guns, in all other armies it is 6 guns. It is believed that a battery of 8 guns is too large and would frequently have to be divided, as has been done during firing, to render its being efficiently handled. In fact the admitted excuse for its existence is economy alone.

There seems to be a growing tendency to favor four-gun batteries. It is now possible with the new Russian field carriage to fire with the 3.42" gun $4\frac{1}{2}$ shots per minute, a rate which can easily be attained by rapid loaders or quick-fire guns now being developed and contemplated by various nations as the armament for their field batteries.

A much slower rate of fire than $4\frac{1}{2}$ shots per minute would enable a four-gun battery to fire faster than the time of flight of the projectile and time consumed in observation of shot would permit. Consequently a greater number of guns could not be

effectively fought by a captain. A four-gun battery could deliver by piece as many aimed shots per minute as a six-gun battery. Therefore if 24 guns be organized into 6 batteries of four guns each instead of into 4 batteries of six guns each there would result two extra batteries which could be used for concentration of fire and thus enable ascendancy over any particular six-gun battery selected. It is claimed that the true function of a rapid-fire gun is to insure intensity of fire in certain extreme cases, but this is hardly correct. An ordinary field battery can by use of fire at will and rapid fire defend its own front from direct attack if the ground be not disadvantageous. The same intensity can be obtained from the guns organized into four-gun batteries as though organized in six-gun batteries, while the former organizations permits more efficient fighting of all the guns.

A four-gun battery is almost too small to withstand any of its pieces being rendered unserviceable or of being temporarily detached, but it is the exception that a piece is more than temporarily disabled and the system of detaching guns from a battery for raiding purposes is rather a vicious than a desirable one.

Four-gun batteries were used during our late rebellion in Sherman's march to the sea and during the Wilderness campaign. In the first instance, in order to have 8 horses per battery and in the last case on account of the wooded country, but it remains as a fact that the four-gun batteries were chosen in preference to a lesser number of six-gun batteries.

The number of guns per army corps ought not be reduced, consequently the arguments that the four-gun battery would result in reducing the length of column in march and the front of battle are not very sound ones.

For horse artillery, under any circumstances, mobility, flexibility and necessity as to number of guns seem to fix the four-gun battery as the proper organization.

In either field or horse artillery this organization would render easier the control of fire and instruction in war tactics. Two things are certain, a four-gun battery organization would enable batteries to be so well officered as to secure excellent fire discipline and result in a healthy organization by reducing the number of subaltern officers per battery, thus tending to keep younger officers in command and in performance of duties suitable to their years.

Batteries are organized in battalions so as not to bring over 24 guns under the command of a battalion commander. With increased rate of fire this will doubtless prove too great a maximum number. The distribution of guns in an army corps is 24 guns to each of the 3 infantry divisions and 48 separately organized as corps artillery. Discussion of the question as to whether it would not be better to distribute all the guns to the divisions is being renewed. All artillerists favor bold and early employment of the guns, the real question being by which system of distribution can this be best done. Adherents of the corps artillery advocate its retention on the ground of the facility it gives in handling masses of artillery. At Sedan and at St. Privat unexpected and prompt arrival of the corps artillery at the front resulted in moments of great pride to Prince Kraft. Our regulations permit the divisional artillery of the rear divisions to be concentrated and march, when there are more than two divisions, at or near the head of the second division, and prescribe that as soon as the direction to be given the attack can be determined, the divisional artillery is to be detached from its division and brought to the front to strengthen the artillery line. These arrangements seem to facilitate all the artillery passing to the control of the corps commander, through his chief of artillery. When the divisions march on separate roads, distribution of the guns to the division would undoubtedly facilitate prompt and bold deployment on the line. The main points are to keep the artillery to the front without depriving the commanding general of having a preponderance of strength at the decisive point. A distribution of 36 guns to each division, with a corps artillery of 12 guns of mobile 5-inch field howitzers, supplied with about an equal number of rounds shrapnel and of shell, filled with great bursting charges, would seem to be a satisfactory arrangement for attaining both ends.

THE NATIONAL GUARD NATIONAL IN NAME ONLY.

BY LIEUT. COLONEL WALTER S. FRAZIER, JR.,

ASSISTANT ADJUTANT GENERAL, ILLINOIS NATIONAL GUARD.

ALTHOUGH much is written nowadays concerning the possibility of war involving the United States, comparatively little attention is given in print to the subject of military readiness for the defensive or offensive except within army circles. The average citizen shrinks from the thought of war, but is supremely confident that Uncle Sam can lick any other nation on earth if he sets about it. Still, this confidence is seldom based upon more than a good digestion and a desire that a conflict should so result, and it would seem well that everything relating to the question of readiness should have free and extended discussion.

But little is heard concerning that military force—which is of equal importance with the army—the National Guard or organized militia. In no other country on the globe could a civilian-by-day—soldier-at-evening force,—such as our National Guard necessarily is, be considered of equal military importance with the Regular, professional army. But the conditions in the United States are unique. Both by law and public opinion, which insures a continuance of the present or similar laws, is this country restricted to a small Regular Army in times of peace, and as soldiers are not made and accoutred in a day or month, it follows that should an emergency be presented requiring the employment of as large a force as was asked for in President Lincoln's first call, the only source that could furnish the requisite number of other than green men would be the National Guard—the modern minute-man service.

Inasmuch as the present numerical strength of the Guard is about five times that of the Army, the statement that it ought to be considered of at least equal importance seems a fair one, the higher degree of efficiency which the Army has been able to attain and maintain because of its singleness of purpose, made possible by governmental support, being counterbalanced by the greater strength of the Guard.

It is not the purpose of this article to laud the Guard, to attempt to add to the dignity of its service, or to demonstrate its readiness for action, but rather to call attention to some of its innate defects, in the belief that with a general knowledge of these shortcomings and an appreciation of their importance there cannot fail to be developed a widespread demand for betterment.

Although most of the States use the word National in designating their organized militia or guard, the appellation is something of a misnomer, for there exists no national control or supervision, no uniformity of instruction, organization, or equipment, and in none of the States is either the enlisted man or officer obligated by the terms of his enlistment or oath of office to serve the United States.

This question of enlistment contract is an important one. While the President is *ex-officio* Commander-in-chief of the militia when called into the service of the United States and can make requisition upon the governor of a State for a certain number of regiments or men, there is no assurance under present conditions that the men or regiments he would get in such an event would be such as have had National Guard training, or that the benefits of existing company, regimental, and brigade organizations would inure to the advantage of the nation; for the members of the Guard have obligated themselves to serve the State, not the National Government, so it must remain optional with every Guardsman, unless drafted, whether or not he shall serve his country, in the absence of the national legislation on the subject. His standing is that of a civilian. The inevitable result of this would be a changing about in the personnel of officers and men upon entering the service of the nation that would impair the acquired efficiency to a serious extent.

The militia law of 1792, which is nominally still in force, defines the militia as consisting of all able-bodied male citizens between the ages of eighteen and forty-five except those following certain callings who are specifically exempt. This law makes it the duty of the company commanders chosen by the States to enroll all those subject to military service under the law, and a fair interpretation would seem to be that a man is not a member of the militia until so enrolled. It might be held that the failure to enroll is simply negligence on the part of the officers which cannot alter the fact of liability, and that the militia consists of

all liable to military service whether enrolled or not, but the first interpretation is held to be the better one. There are no such enrollments nowadays and therefore there is no national militia. With this interpretation of the law it follows that were the President to exercise the power conferred by the section—" * * * it shall be lawful for the President to call forth such number of the militia of the State or States most convenient to the place of danger or scene of action as he may deem necessary to repel such invasion or to suppress such rebellion and to issue his orders for that purpose to such officers of the militia as he may think proper," such orders would apply with equal force to all subject to military duty within the jurisdiction of the officers designated and that any attempt to select National Guardsmen or any National Guard organizations as being solely subject to such orders would be illegal.

New York has her infantry armed with the Remington rifle; Connecticut has all but one regiment armed with the Peabody; Florida, Virginia and Wyoming have some of their men armed with .50-calibre Springfields; while all of the other States have the .45-calibre Springfield, and the infantry regiments of the army are equipped with the Krag-Jorgensen magazine rifle. These rifles require different manipulation and ammunition, complicating the problem of ammunition supply in active service.

Brigades are authorized in some States and in others not. When authorized there is a great variation in the number and rank of staff officers.

There is but one major authorized for each regiment in Arkansas, Virginia, Texas, Louisiana, Montana, Nevada, New Jersey, Washington, Wyoming, New Mexico and Minnesota, so that it is of course impossible to have more than two battalion regiments in these States, and two are only possible when the lieutenant-colonel commands a battalion. Kentucky, Michigan, Missouri, New Hampshire, North Carolina, North Dakota, Rhode Island and Oregon allow two majors to each regiment, while most of the other States have adopted the three battalion regimental formation, each battalion (commanded by a major) being composed of four companies. In this connection it seems pertinent to express regret that Congress has never recognized the present drill regulations to the extent of authorizing for the army the formation made mandatory by them, and put an end to the anomalous, conflicting condition now existing.

Not more than eight States have supplied their troops with field-cooking outfits.

Company officers, who are elected by the members of the companies in all the States, are given commissions regardless of their fitness, in at least eighteen States.

What then is manifestly needed is national supervision. Uniformity is in no line more essential to efficiency than in military organizations. Uniformity or unity of purpose is in fact the distinguishing difference between an army and a crowd, between military efficiency and the lack of it. The question is naturally raised whether any changes for the better are practicable, without infringing upon the prerogatives of the States, or increasing the appropriation for military purposes. The times are such that no proposition involving an increase in appropriations is likely to receive favorable consideration in Congress, and the Army, like many citizens, is chronically short of funds, so that any attempt to secure an increase in the amount now divided among the State for militia purposes would doubtless be opposed by strong influence.

As the prime reason for the existence of the National Guard is and must always be the defense of the nation, national supervision seems not only eminently proper but essential, in order that the maximum defensive power may be secured with the minimum expenditure for militarism. A wealthy, defensively weak republic invites dissolution by attack from without, while on the other hand, a republic strong in a military sense, on land and sea, is ripe for imperialism or war of aggression. No other force can be so potential for preserving a mean between these extremes as an efficient citizen-soldiery trained to fight to preserve peace,—to use a paradoxical expression.

The custom obtains in this country of nationalizing all institutions when it becomes apparent beyond question that lack of national supervision results in injustice or weakness in a national sense. Although the National Banking Act was based upon the existing needs of the treasury, it had its inception in the fact that the welfare of the people was best conserved by federal control.

The Inter-State Commerce Law is another illustration of this tendency toward a centralization government—of the development from a federation of self-assertive States of a strong republican nation.

Mr. Jas. Bryce in his remarkable work, "The American Commonwealth," says :

"It is nevertheless impossible to ignore the growing strength of the centripetal and unifying forces. There is an increasing tendency to invoke congressional legislation to deal with matters, such as railroads, which cannot be adequately handled by State laws. * * * In the United States all the elements of a national feeling are present, race, language, literature, pride in past achievements, uniformity of political habits and ideas, and this national feeling which unifies the people is reinforced by an immensely strong, material interest in the maintenance of a single government over the breadth of the continent. It may, therefore, be concluded that while there is no present likelihood of change from a federal to a consolidated republic, and while the existing legal rights and functions of the several States may remain undiminished for many years to come, the importance of the States will decline as the majesty and authority of the National Government increase."

The Constitution confers upon Congress the power to provide for organizing, arming, and disciplining the militia, reserving to the State governments the appointment of the officers and the authority of applying the discipline prescribed by Congress.

The jurisdiction of Congress therefore appears unquestionable. What is needed is a Federal Militia or National Guard law creating a distinction between the organized militia and the unorganized militia, making it mandatory for the States to organize, equip, and maintain National Guard forces proportionate in size to their representation in Congress, specifying methods of organization, details of equipment, and scope of instruction, providing a uniform enlistment contract, requiring thorough inspection at stated intervals.

This supervision should, of course, be exercised through the War Department. But the Guard should be coördinate with rather than subordinate to the Army, and the arms and equipment for both services should be identical.

An enlistment contract embodying the idea of dual obligation and service should read about as follows :

I solemnly swear that I will bear true allegiance to the United States and the State of New York, and that I will support the Constitution thereof, that I will faithfully serve the United States and the State of New York, in the National Guard of the State

of New York, for the period of three (or five) years unless sooner discharged, that I will obey the orders of such officers as may be placed over me, and the laws of the United States and the State of New York governing the National Guard forces.

Two yearly inspections should be provided for, one of them to occur during the annual encampment and the other at home stations during the fall or early winter when military discipline and instruction are very apt to be ebbing, particularly in the case of detached companies, which constitute a very large portion of the National Guard. The larger the command remaining intact during the year, the easier is it to maintain that *esprit de corps*, without which no good work can be accomplished in an amateur, unpaid organization, and the smaller the detachment the greater the necessity for thorough inspection.

But these are matters of detail which can be readily determined upon when once the nationalizing of the Guard is begun.

That Army Officers who have opportunity for observation become impressed with the necessity for Federal control is shown by the following extract from a report of Capt. H. O. S. Heistand, 11th Infantry, a discerning officer, who has been on duty with the Ohio National Guard for several years:—

“What is needed by the National Guard, not only of Ohio but of the entire country, is to be nationalized to the extent that all will be governed by the same laws and regulations, armed with the same arms, and clothed in the same uniform.”

RECENT DEVELOPMENTS IN HORSE-SHOEING.

BY LIEUT. MELVIN W. ROWELL, 10TH U. S. CAVALRY.

THE rapidly increasing use of asphalt and other pavements in cities has created a demand for a serviceable horse shoe which will prevent slipping when pavements are greasy or covered with ice; for the claim that the horse will, without further artificial aid, eventually become so accustomed to such surfaces as to be able to properly perform his work thereon is hardly to be credited. Meanwhile, should a shoe designed with this purpose in view incidentally lessen the shock of the hoof in striking the ground and also prevent the injurious contraction at the heel of the hoof, arising from standing on the dry stall floors in overheated city stables and frequently from faulty shoeing, the period of useful service of city horses would be greatly increased. It is apparent that for general use a non-slipping horse-shoe must be serviceable, reasonably economical, and of such simplicity that it can be set by any blacksmith. Whatever the form of shoe believed by horse owners to be best suited for this purpose it is to be expected that conservative blacksmiths, being fond of carving and mechanical construction, will stubbornly oppose any progress which tends to reduce them to mere setters on of shoes.

The plain steel shoe fulfills its function in presenting a hard surface for wear; it does not prevent slipping upon pavements nor does it destroy shock. The shoe with calks is largely used to prevent slipping and particularly to give hold, or purchase, for heavy-draft horses. It sometimes tears off and frequently causes corns, sprains, and wrenches. As the calks soon wear down it does not long prevent slipping upon smooth or greasy surfaces; moreover, the wearing away of the toe calks first, elevating the heels, increases the liability to navicular disease. In both of these shoes the functions given by nature to the frog and other structures of the hoof to reduce shock and prevent slipping are not made use of and there soon results, from the drying out of horny structures and often from the knife of the blacksmith who delights in cutting away the frog and in paring down to a mere film the arched sole, a contraction at the heel frequently accompanied

by serious complications. The attachment of the shoe to the foot by means of nails driven through the wall of the hoof seems to be a necessary evil, although recent experiments abroad with a nailless shoe are said to have been successful. Theoretically the Charlier shoe, or tip, permitting the use of the frog as in nature, would be an excellent means to prevent slipping, but it is not believed that the bare frog, already subject to deteriorating influences in city stables, is able to withstand the severe shock of hard pavements, while the dangers of bruises and punctures of the frog and sole are increased.

To meet the conditions imposed by city pavements there have recently appeared shoes in which rubber is used in one way or another. At first a rubber pad was placed over the bearing surface of the foot and slightly projecting below the ground surface of the steel shoe which was set as usual, the nails passing through the rubber; but owing to the resiliency of this substance the nails were soon drawn. Next might be noted a steel shoe of special design, placed upon the foot as usual, a groove in the ground bearing surface of the shoe holding a strip of rubber. As the rubber soon wore down and was expensive to replace this pattern was not successful.

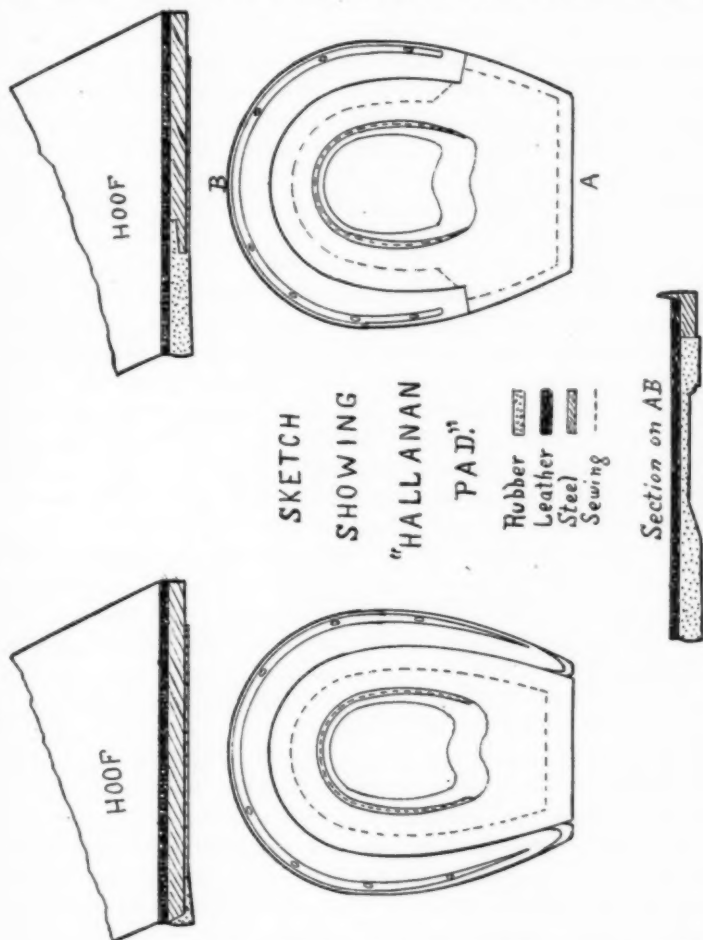
At present rubber-pad, steel shoes are coming largely into use in New York and vicinity during the winter months. The serviceability and other merits of one form of these shoes, known to the trade as the "Hallanan pad," have impressed me so favorably that I will describe it in detail. First the foot of the horse, prepared by *rasping down the seat of the shoe only*, is covered with a mixture of tar and oakum which fills the cavities presented by the sole and heels. Over this is placed a leather covering, not quite one-quarter of an inch in thickness, which covers the entire bearing surface of the foot. The common steel shoe, or the steel tip, rests on this leather covering opposite its usual seat, the nails being driven as in ordinary shoeing and through the leather. A pad of rubber and canvas is stoutly attached to the leather covering and covers it completely, except such portion as is occupied by the steel shoe. The pad is thicker at all points, except a concavity in the centre near the point of the frog, than the steel shoe, and being of greater relative thickness at the heel more elasticity is given at this point, as in nature. When the steel tip is used, and this form I believe to be the best, by cutting half way through the tip at the heel a projection

about three-quarters of an inch in length is formed, which, resting on a corresponding raised portion of the pad, supports and holds firmly in place the heel of the pad—the pad in this case being extended laterally so that its outer limit in plan coincides, in rear of the line joining the heels of the complete upper portion of the tip, with the outer edge of the leather covering.

It is evident that we have here a shoe which will not only prevent slipping within reasonable limits, but that this form of shoe in reducing shock assists and brings into play to a large extent the important functions of the frog and plantar cushion as intended by nature, and that the danger to the hoof of contracting through dryness and other causes is avoided. The principal objection which will be raised to such a shoe is founded upon the undue heat and retention of moisture caused by the closed leather covering and the packing of tar and oakum which has been used to insure a proper bearing surface. Without question the frog and horny sole will be softened, but as far as I have been able to ascertain no injurious results have followed therefrom; yet, if after long and continuous use of this shoe such should be the case, it might be expected that those horses would suffer most whose horny structures had previously been impaired by the misuse of the blacksmith's knife. At any rate, it is believed that this condition of moisture is less harmful than the many evils at present produced by the heat and dryness of city stables and by faulty shoeing. While in well-regulated stables the shoes are removed, the hoofs rasped down, and the horses reshod (shoes frequently being reset) once every three to five weeks, the Hallanan pad is often left on from five to six weeks with results which do not appear to be injurious. This shoe has now been in use for some time and no harmful results are known to have followed from this feature of moisture even in those cases where the shoe has been worn continuously for two-thirds of the year without being removed oftener than once in five weeks; in fact, the very reverse is reported to be the case, and instances have been observed in which horses afflicted with corns or navicular disease to an extent of being almost useless, have, through this shoe, been so far relieved as to be continued in use.

The Hallanan horse-shoe pad has received the endorsement of the fire departments of large cities, of prominent veterinarians, of humane societies, and of well-known horse owners as to its merits with respect to the uses for which it was designed. It is

coming much into use for coach horses and for other types of city horses and is used exclusively (the steel tip form) by the fire departments of New York, Brooklyn, Newark, N. J., and Montreal, Canada, in which services it has given universal satisfaction. Dis-



interested firemen and drivers speak very highly of its merits, saying that where their horses drawing heavy trucks were wont to timidly slip and slide, scrambling for footing, they now get along safely and without fear. The nature of the work demanded

of fire horses over every kind of city pavement is perhaps the best test of the serviceability and efficiency of this shoe. With respect to coach horses I have frequently observed that the fore feet alone were shod with a pad, the hind feet being shod smooth or with calks, a practice which is not only economical but reasonable, for it is here (forward) that the principal weight is borne and here that the horse first "staves up." Yet the shoeing of the hind feet also with the rubber pad is considered essential where any load has to be drawn over slippery pavements or when much stopping and starting thereon is necessary.

As for the mounted service, the saddle horse is no more able to perform his work on slippery surfaces than the draft horse, while the shock upon his fore feet due to the weight he carries is much greater. In the limited field of use in which a rubber pad is particularly serviceable to mounted troops the cavalryman's objection on the old ground of "an ounce at the foot is a pound at the shoulder" is of little importance, although a more serious objection is found in the increased expense, as the cost of these pads, exclusive of steel shoes, is about three dollars per set of four. On the other hand, it will be observed that horses shod with a pad cannot tear each other up by that incessant kicking which occurs at the picket line, and that the covering of the entire foot protects the frog and sole from bruises and punctures by nails, stones, glass, and other objects which troops doing much service in and around cities must expect to ride over. Although the general needs and present local conditions of the mounted service do not demand the constant use of this type of rubber pad horse-shoe, it is believed that conditions might arise where its temporary use would not only be a benefit but a necessity, for it may not be going too far in saying that occasions are possible where the activity and efficiency of cavalry and light artillery in cities would for a time be vitally impaired by the lack of such a shoe. At any rate, asphalt pavements are becoming so general in the large cities that the use of a non-slipping horse-shoe by mounted troops doing service therein, whether riot duty, patrolling, etc., or the less arduous duty of street parades, will contribute materially to the confidence and efficiency of the horse and his rider.

THE QUESTION OF AN ARTILLERY RESERVE.

BY FIRST LIEUT. WM. E. BIRKHIMER, 3D U. S. ARTILLERY.

IT is proposed to treat this subject in its relations to an army of United States troops. Our military position is peculiar.

The national government has adopted no method of training all its citizens to the use of arms. The disposition of our people, their occupations, our geographical isolation from the great military nations, all give tone to our national policy, which is to devote our energies to civil and peaceful rather than to war-like pursuits.

Yet an experience now of upwards of 100 years has taught that we must, in some measure, cultivate that knowledge which will enable us to fit out and command armies, and to prepare our sea-coast for defense. As to the former, the military policy of our Government is not so nebulous as some people seem to think. It consists in the maintenance of a small regular army, wherein the number of officers is greatly in excess of actual need for purposes of command and of administration, in order that a highly trained and competent corps of surplus officers may ever be ready for assignment to other duties. When war intervenes, volunteers are called out to prosecute it in conjunction with either the old or augmented regulars. As a rule, in the higher grades, the whole army is officered from the regulars. It is believed that this policy will be perpetuated. It were easy, but unnecessary to assign reasons. It unites, apparently, the maximum of military efficiency combined with that minimum of military expense, which ever is a matter of solicitude with our people: and in this the will of the people is the supreme law. As a result of this peculiar organization of any large army which the United States will send into the field, it may follow that an artillery reserve might be found necessary with it when others might not have one. As the personnel of the contending forces might be brought into the field under wholly different principles as to recruitment, so, also, might it be true that, if greatest efficiency is to be attained, their details of organization would differ.

In the United States, authorities on the subject of an army artillery reserve are conflicting. In the work "Troops in Cam-

paign," issued by order of the President in 1892, it is enjoined that under ordinary circumstances, not to exceed three-fourths of the field artillery will be assigned to corps and divisions, the remainder being organized into brigades and constituting the reserve artillery of the army. We have heard it suggested that "reserve artillery" is wholly different from "artillery reserve"; but the distinction is without a perceptible difference; and it is held here, accordingly, that the prescriptions of "Troops in Campaign" go to the point of authorizing an artillery reserve, in an army of two or more corps, composed of at least one-fourth the total number of field-pieces.

On the other hand, the Light Artillery Drill Regulations, also approved by the President, recognize no such reserve. They enjoin the assignment of all the artillery to either divisions or corps, after the fashion generally in Europe subsequent to, and in some European armies before 1870. And in this connection it is interesting to notice that during the last stages of the War of the Rebellion the artillery reserve of the Army of Northern Virginia, under General Lee, was abolished, and the batteries distributed to corps and divisions.

So far, therefore, as mere prescription goes, we have, in our service, authority both for and against an artillery reserve. How stands the reason of the thing?

What is the use of an artillery reserve? This has differed in various armies. Napoleon used it as the last weapon, to be launched, as he could do it, upon the critical point of attack, with overwhelming effect. If others could use it as he did, it generally would be conceded to be an excellent thing despite any drawbacks that might attend it. But we do not expect Napoleons habitually to command United States armies. How, then, does the question present itself in an army under an ordinarily competent commander, loyally supported by his subordinates.

We have had one experience going directly to the elucidation of this point that we ought to study with care. When the Army of the Potomac was organized, it was given an artillery reserve composed of about one-third of the total number of guns. This, with various mutations of fortune, was maintained until the Wilderness campaign was begun in May, 1864. Then the reserve temporarily was broken up, the surplus guns sent to the rear, and the caissons attached to the batteries retained. The Wilderness campaign was fought without an army artillery reserve.

Yet, without specific orders, and from sheer force of circumstances, it was reorganized soon afterwards.

During its existence it furnished not only batteries for all the battles, but also a depot of supplies for guns distributed to troops. The reserve did not mean a great mass of field artillery kept back at some place in rear, away from the fighting, without any assigned function on the battle-field, and principally known to the army by its being in the way of marching columns. Very far from it. On the contrary, it was a special organization, capable of being used with great power by one who understood its properties, kept ready at the hand of the army commander to put into action when and wherever the phases of the battle demanded. It was the almost unfailing experience that every gun of the reserve went into the contest if at all prolonged. In the great battles, all its batteries went into the fight. They sometimes began it. This was conspicuously the case at Malvern Hill. And of its use there one of the ablest Confederate fighters said: "The battle, with all its melancholy results, proved that the Confederate infantry and Federal artillery, side by side on the same field, need fear no foe on earth."

But there was another use to which the artillery reserve was put that was scarcely less valuable, although less attractive and attended with less *éclat* than its fighting qualities. It furnished the means of re-supplying on the spot, and without delay, knocked to pieces and broken down batteries. For the first time corps commanders appreciated this fact after the reserve was broken up as mentioned, and it was one of the causes leading to its reestablishment. Before that, these commanders had never given the subject of rehabilitating a broken-down battery or their exhausted caissons much thought: that matter had been attended to by others. But when their source of recuperation disappeared, they began to appreciate its value.

The reasons for breaking up the artillery reserve in May, 1864, as before mentioned, were perhaps manifold. The fighting was in a country where roads were scarce, and underbrush covered the face of nature with a veil almost impenetrable. The enemy was everywhere entrenched behind earthworks that were too strong for the field artillery of that day to destroy. It was absolutely necessary as much as possible to reduce transportation. The battles were death grapples of giant opponents, in the bushes, which never relaxed from start to finish—and extending over a

twelve-month. Then again, an artillery reserve, organized like that of the Army of the Potomac, and handled like that was, had not formed a distinct feature of those armies in the West commanded by General Grant. He in all probability never had his attention called in a particular manner to its necessity or utility as one of the essential parts of an army. Under all these circumstances, it is not perhaps to be wondered at that General Grant broke it up. The truth is that, until after the army crossed the James River, the character of the country almost forbade taking the reserve along; and after that event it again came into being, but principally for purposes of recuperating and supplying batteries attached to corps. So that in point of fact the mere circumstance that the artillery reserve was broken up for a while does not, of itself, operate, when properly understood, to the prejudice of the principle involved in assigning it a certain and understood place in the organization of armies. The terrain, in the opinion of the new army commander, rendered its use for a time problematical, and its dissolution, which proved to be but transient, advisable.

In his report dated October 31, 1864, General Hunt, Chief of Artillery, Army of the Potomac, spoke of the artillery reserve as follows: "Its records prove that on the field it has done its full share of the fighting, and borne its due proportion of the losses of the artillery, while it has rendered other and fully as important services. At many of our principal battles, notably at Malvern Hill and Antietam, its ammunition trains supplied the batteries of the divisions, many of which otherwise would have been rendered useless. Whenever from the character of the ground or from other circumstances, the ordinary amount of artillery attached to troops proved insufficient, it has supplied the deficiency. Its batteries, in all our great battles, have always gone into action at critical moments, and almost invariably every gun has been called for and employed. Especially was this the case at Malvern, Antietam, Fredericksburg and Gettysburg. It has also been of great value in another way. Batteries in the corps losing their efficiency either from the want of men or material, the incompetency of their officers or the casualties of battle, have been at once replaced from the reserve, thus keeping the army corps fully effective. I have considered this notice of the reserve artillery necessary under the circumstances in order to guard against the inferences which might be drawn from the order to break it up.

The inconveniences that have since been felt from want of it, the order to return the guns to the batteries, now being executed, and the fact that it has been found necessary to keep up the reality, without the proper organization of the reserve, in order to insure supplies of ammunition to the army and furnish a place for surplus, unattached and disabled batteries, has clearly vindicated the principle of the necessity of such an organization in a large army."

It is believed that there are stronger reasons in the United States for having an artillery reserve with any army, say of the size of the Army of the Potomac, than in some other services. It results from the constitution of our armies. From the necessity of the case it has always been true that officers who, until war broke out, were civilians, are commanding divisions and in some cases army corps. It practically is a most difficult thing to persuade these officers that a necessity exists for taking their artillery from them even temporarily, to concentrate it *en masse*, as a reserve is used. Of course it is easy enough for the army commander to order this, and it should be easy to enforce his orders. But, in an army officered like ours will be, largely of volunteers, whose political influence is great, however little or much may be their real military merit, the Commanding General may often hesitate to exercise authority that may be easily enforced, yet which gives rise to protests from subordinate commanders on the eve of or during battle. That is precisely what took place at Fredericksburg. Division commanders, when called on, vigorously demurred when it was proposed to borrow their artillery for even a short time to prepare for crossing the army over the river in the face of the enemy. They would indeed obey the order, so temporarily detaching their artillery, but would not be responsible for the consequences. That was the spirit manifested; that the language used. Now there is nothing more disquieting, we readily may suppose, to an army commander than to have his subordinates complaining of ill treatment when fighting is imminent. It readily is seen how anxious he would be to obviate such trouble in the future. An artillery reserve, promptly kept at hand would enable him to do this. And there is something to be said on the side of division commanders under such circumstances. They, it is to be presumed by careful training, bring up all their forces to the true fighting point. They practice them all together and as a body. They do this in order that their divisions,

as units, may acquit themselves with credit on the battle-field. It is truly discouraging from this point of view to be deprived of their artillery just at the time when they probably will most need it. No wonder then that our volunteer division commanders protest, when, in the act of taking place in line of battle, their batteries are taken from them. In an army like the German, and those of other Continental powers, where all the officers are experienced and disciplined commanders, it may prove easy thus to detach artillery from their divisions or corps. But in the nature of things the United States will never have one generally so officered. It is the part of wisdom to organize our armies to meet our own national situation. Let us, therefore, leave our volunteer or inexperienced subordinate generals in full possession of their divisions or other commands, and not organize our army in such manner that these subordinates will be deliberately disconcerted at the very time when their only thoughts should, where this is practicable, be directed solely to getting the most fighting out of their troops.

Consider the situation of affairs on the Union side at Gettysburg. The Commanding General was new to his position. The corps and division commanders were not, except in a very few cases, of his selection. So far from this being so, reasons exist for the belief that in many of them he had little confidence. Can it not be imagined that he regarded with supreme satisfaction the presence, directly at his command, of that superb artillery reserve of the army which, on that decisive field, put every gun into the fight. On the other hand, how different would have been his position had he to depend upon borrowing artillery at the critical periods of battle from division and corps commanders, each one of whom might deem himself as sustaining the brunt of the fight, and sent his guns grudgingly and with the half threat that he "would not be responsible for the consequences."

For the reasons given, and for others, it is believed that, in any large army of United States troops, an artillery reserve would be an essential feature of the organization even although in a more thoroughly disciplined one, as any government of Continental Europe, for instance, would send into the field, it might not be found necessary. This belief is predicted upon two assumed facts: First, that the army commander is competent, and justly appreciates the power of modern field artillery: second, that he will have a chief of artillery, who is fit for his place, and

who, among other duties, will have command of, or at least the direction and management of this reserve. It is believed that we reasonably can presume that both of these conditions will be fulfilled.

The situation of the Confederate army at Gettysburg may be cited as proof that it is possible to collect divisional and corps artillery for all purposes. There is no doubt but that General Lee did so collect his artillery for his grand cannonade immediately preceding Pickett's charge, and perhaps at other times during the battle. As to this, I will say, that no army ever came upon the field more fashioned to the hand of its commander than was the Confederate at that battle. It had just been reorganized, and the corps commanders selected by General Lee. There never was an army that went into a battle with greater confidence extending from the head to all the parts than his on that occasion. The Southern Confederacy, although ostensibly a republic, was in 1863 as complete a military despotism as the wit of man ever devised. The Army of Northern Virginia in great degree represented the power of the Confederate government, and, for all fighting purposes, General Lee held in his hand and alone wielded that power. No one will deny that this was creditable to the intelligence of that government: they were in a contest with a superior power, and were in it to win if they could; to do this they did not hesitate to vest the commander of their main army with almost if not quite absolute military authority. This rendered it easy, natural, and as a matter of course for General Lee to handle his troops as to him seemed best, and without even a suspicion of a question being raised by a subordinate as to either the legality or expediency, of his orders. They never at that time questioned his acts, however much defeat has since given them a predilection for doing it.

The difference in the predicaments of the two opposing commanders on that eventful field, which here has been glanced at, will explain the greater necessity of an artillery reserve to the one than to the other. And, all things considered, we feel justified in regarding the Union army at Gettysburg as the ideal American Army. Not but that it had weaknesses; and the newness of the Commanding General was one of these: but, take it all in all, weaknesses and elements of strength together, it was a representative United States Army in the highest practicable state of development.

We must not be too hasty in permitting the inference to arise

that, because General Lee broke up his artillery reserve and assigned all batteries to army corps, therefore he preferred, other things being equal, not to have such a reserve. If we did this, we would make, from a professional point of view, a great mistake. In point of fact, just before June, 1863, his army had but two corps. During that month (on eve of Gettysburg) it was organized into three corps. To supply them all with artillery, the whole mass belonging to the army, reserve and corps alike, was divided up among the three army corps. This gave each something less than each of the old corps had.

There were doubtless other potent considerations leading to this action. Without doing the least injustice to the brave and devoted departed, it can with truth be said that the artillery reserve of the Army of Northern Virginia was not handled so well as that of its opponent. It never took so prominent a part or played so important a rôle as did the artillery reserve of the Army of the Potomac. No wonder, therefore, that corps commanders grew impatient to have it gotten out of the way. Had the chief of artillery of that army been a more active man, permeated with enthusiasm for his arm, perfectly conversant with its powers, and how these were best to be utilized, the record of the artillery in the Army of Northern Virginia might and probably would have been different.

Fortunately for the Union cause, and the success of its arms, every soldierly and professional qualification was illustrated in a conspicuous degree in the accomplished chief of artillery of the Army of the Potomac and commander of its artillery reserve. These personal characteristics will be found to account, in great degree, although not wholly, for the parts played by the artillery reserves in the opposing armies.

In truth, at this time (1897), the armies of Continental Europe are organizing heavy field artillery batteries for the express purpose for which Napoleon used his artillery reserve. A short time since each of the 20 German army corps had 8 of these batteries. Of these only a few were horsed last year. The other governments are moving in the same direction. The following are the characteristics of the ordnance so used in some armies:

	Calibre.	Piece.	Weight.	Wgt. shot (lbs.) shell.	Charge (lbs.)
Austria —Gun	4.72 in.		3,748	36.8	10.58
" —Mortar	4.72		....	....	....
Russia —Mortar	6.00		1,012	68.0	3.85
Germany—Howitzer	5.87		3,307	60.7	3.3

We may be pardoned for calling attention to the fact that in the armament of the Army of the Potomac were batteries of precisely these natures: and they moved with that army wherever it went. When McClellan landed on the Peninsula in 1862 he took 4.5 inch gun batteries, the piece weighing 3570 lbs., firing a solid shot weighing 35.5 lbs., and in fact, for its day, this gun was seemingly the counterpart of the Austrian gun above mentioned as now coming into use. And as to mortars, there were a large number carried along with General Grant's army in 1864 and 1865, for one of the express purposes for which European governments now propose to use them, namely, to drive an enemy out of a field-work where he is so intrenched that field-gun projectiles can not reach him. With regard, therefore, to the use of heavy pieces with a manœuvring army, it is a fact that Continental states are coming now to where we were thirty-five years ago. Yet there is a great difference in the way in which such pieces were and are utilized in the two cases. In Europe they have gone into the matter systematically. Our efforts were rather sporadic in their nature.

Not much has been written on this new feature of European field artillery: and it is asserted, with how much truth is not known, that measures are taken to keep the matter secret. However, what has been written is interesting from its bearing upon the question of an artillery reserve: for if any part of the artillery is purposely and by organization destined for and made to play that part, it is in fact an artillery reserve although it be not called such.

Upon this point a German military journal remarks that when the battle is sufficiently advanced to enable the forces in presence of one another to be estimated, then the moment has arrived to bring the heavy batteries into play, with a firm resolve to decide the issue. And it remarks that, thanks to the enormous effect of their projectiles, these heavier field-pieces will produce, both morally and physically, an effect which it would be impossible to obtain by other means. The object of the heavy batteries, it is observed, is to shake the enemy's infantry, upon the point where the Commander-in-chief has decided to break through.

Commenting upon this latest phase of the artillery question, Lieut.-Colonel Browne, late Royal Artillery, remarks: "If we wish to summarize the present idea, it may be said that what is recommended is the creation of an ideal artillery reserve, sufficiently light not to interfere with the manœuvring power necessary

for field armies, but at the same time powerful enough to provide the Commander-in-chief with a certain means of forcing on the decision of the combat, by producing effects hitherto unknown both in a material and moral point of view."

From all this it appears that just at the time when the practices in European armies had given foundation for the belief that, with them, army artillery reserves were a thing of the past, this feature of army organization appears in a new but nevertheless a certain substantial and unequivocal form. The manner in which it is proposed to use it clearly characterizes it, in the language of Lt.-Col. Browne, as an artillery reserve. It is to be used precisely as Napoleon employed his. Its characteristics are wholly those of such an organization. This, its nature, determines, then, what the organization is, and what it should be designated: but whether it be so designated or not cannot change the fact that in reality it is an artillery reserve. We are told that, the point for breaking through the enemy's line having been fixed upon, this new accessory is to be crowded to the front to overwhelm it by the superior power of the projectiles. When we hear this we may almost delude ourselves with the belief that we are reading Jomini's maxims as evolved from the practice of the great master in the art of war. The necessity for, and the theoretical use of the artillery reserve at the commencement and end of the nineteenth century appears, therefore, to be identical.

Our light artillery drill regulations assign the corps artillery a place well to the front during the march. It is preceded by nothing more than the leading brigade and divisional artillery of the leading division. Of course circumstances may change this; but that given is the normal position. Now, the theory underlying marches in presence of the enemy is, that troops will be arranged from front to rear in column in the order in which they will be brought into action. This position of the corps artillery presupposes, therefore, its early employment in the battle, where its position, assigned by the drill regulations, is either in the centre or on the inner flank of the corps.

It is possible that the artillery in many instances may be handled the more easily on the march, when thus broken up and distributed among corps. Indeed, the practice now advocated in some services, Germany among them, is to scatter the ordinary corps field artillery among the divisions. This would further subdivide it for marching, and might facilitate the latter. But it

would render the concentration of artillery masses the more difficult, and with us would perhaps make it impracticable. The veteran division commanders of Germany might promptly respond when the army commander called for their artillery. We have no reason from experience to think that our less disciplined volunteer officers would do the same. Our general, therefore, must keep this weapon in his own hand.

After having travelled over Europe General Grant remarked that no rules will apply to conditions of war so different as those which exist in Europe and America. "Compare," said he, "the invasion of France by the Germans with the invasion of the South. The Germans moved from town to town, every town being a base of supply. They had no bridges to build. They had no corduroy roads to make, and I question if a corduroy road was made in the whole campaign. I saw no reasons for one in my journeys through France. I saw the finest roads in the world. The difficulties of a campaign in an open country, generally a wilderness like America, especially as compared with a highly cultivated country like France, are incalculable." Nor is the face of nature, such as here is so clearly described, more unlike than the methods of raising troops and officering them in the two hemispheres. Neither does our divergence of military methods stop here. They extend in their diversity to nearly every incident in the conduct of the war. In Europe certain military maxims are observed, and, so far as practicable, war with them is reduced to a science. It is characterized by many rules that are necessary in all countries, notably their recognition of new appliances, and indefatigable industry not only in developing, but if of value, in practically applying them. While this is so, it is necessary for us, in adopting European ideas, carefully to consider whether these, the precepts and practices of military nations, are really applicable to the army of a conspicuously non-military nation like the United States.

Aside from certain considerations of general applicability in all civilized warfare, the circumstances of the particular case when it arises will determine whether we should follow, and if at all how closely, the European methods. To this rule the matter of an Army Artillery Reserve is no exception. Even if European armies could dispense with them, which in fact they do not seem to be able to do, it by no means follows that we can do likewise. And in truth, it does not seem probable that we ever wisely can

dispense with it. Our army commander, if competent for his duties, and capable of fighting the arms to advantage, will need an artillery reserve, always at his bidding, to place in the action wherever the exigencies of the fight demand, in order to obviate those difficulties that may attend his position resulting from the imperfectly trained army with which alone the Republic insists on supplying its generals.

THE SANITARY SERGEANT.

BY MAJOR C. L. HEIZMAN, SURGEON U. S. A.

AT this day it may be said to be a truism that, whatever relative value is given to the military virtues, they are all dependent for their effectiveness on a healthy body and a sound mind.

Military hygiene, as a means to the end, has grown very much in the esteem of great leaders and writers since the period when Xenophon recorded the advice of Cambyzes to Cyrus, and, along with recognition of its importance, it has developed into a science that has added to its purposes, is extending its field and is ever inventing new measures toward perfecting the soldier and his surroundings. Prior to the Persian king's recommendation regarding the selection of sites for camps, the Egyptians and Hebrews practiced police of grounds, disposal of offal and excrement, gymnastic exercises, as wrestling, leaping, running, cudgeling, and fixed dietetics. The physical education of the Spartan soldier is proverbial, and to well ordered bodily training, attention to food, clothing, and camps, and regulated bathing was due undoubtedly the remarkable success of the ancient Roman armies in enduring marches through the most varying climates and residence in the most insalubrious localities without suffering much from diseases that have destroyed modern armies. As far as we know, military officers exclusively had charge of these matters, it being surmised that it pertained to the prefect of the camp among the Romans until the time of Vegetius, fourth century, when it is certain that the legionary tribunes under the presidency of the prefect formed a sanitary council, the duties, that were not strictly military, of physicians being confined to the

treatment of diseases and wounds. This author is the first of the ancient, whose works have been preserved, who treats minutely of military hygiene, ten chapters of one book and two of another being devoted to the subject. In these are discussed the nationality, nativity, age, height, previous trade or profession, and physical character of recruits, mental and physical qualifications required before the *stigmata*, or soldiers' marks, were permitted; marching, running, and swimming drills, thrusting and exercise of arms and precepts for keeping healthy according to places, times, and kinds of water. Altogether it appears that the principal object of hygiene through antiquity was to cultivate vigor of body and, only indirectly, to prevent disease. This idea prevailed to such an extent that, as Cicero expresses it, the very name of army,—*exercitus*,—was derived from the labors required to make of a sound young recruit a sturdy old soldier.

In the ninth century the Emperor Leo (*Institutiones Militares*) enumerated hygienic precautions necessary for the well-being of an army. It was for the general to contend against idleness, intemperance, luxury, desire of gain, and superstitious belief in auguries and divinations among the soldiers; for the military physicians, against diseases caused by heat, cold, fatigue, change of water, unhealthy camps, inclemency of climate, and bad nourishment. Judging from the ravages of epidemics in the middle ages it may be concluded, that both duties fell into disuse. Nevertheless, medical writers, principally Arab, began, on this account and because of the ephemeral character of armies, as large bodies, not allowing systematic physical training, to give attention to the prevention of camp diseases, and thenceforward to the nineteenth century this purpose predominated.

In France, in the sixteenth century, André de Bourdeille, "Maximes et Advis du Maniement de la Guerre," states that it was the duty of the *Mareschal-de-Camp* to look after the health of the army, to keep the camp clean, to examine the water supply, to see that refuse was burnt, the actual duty being under the control of the *Prevosts*, to care for the sick and remove them to hospitals which he was to establish in neighboring towns. This official, an evident legacy from the ancient Roman organization, lasted, with ill-defined command, until 1678. The sanitary condition of the soldier was much ameliorated in the seventeenth century by gradual increase in number of commissaires of war, by the elevation of character and responsibility of the *Mestres*.

de Camp and captains, regimental officers, and by the establishment of inspectors, upon all of whom were conferred different and more exact powers toward that end as well as for the improvement of discipline. Though Turenne regarded the health of the soldier as a precious boon, in his time physicians were rarely called upon for advice. A few, however, who were attached to the persons of generals, made observations of their own accord which they published. In the eighteenth century regimental autonomy was somewhat diminished, but colonels and quartermasters had still everything of consequence to do with sanitation. Physicians, distinct from surgeons, were now regularly assigned as officers to corps, as few as one to ten thousand men, and to some of them we owe writings, that will be classical for all time, on military hygiene still occupied for the most part with diseases and their prevention. Toward the end of the century army regulations provided for certain sanitary measures, and an eminent medical authority, Laveran, says of this period that the common sense of the generals and the intelligence of the physicians made up for the deficiency of the regulations. But all generals were not Earls of Stair and Klebers, nor all army physicians, Pringles and Desgenettes. Since Napoleon, in 1797, remarked that health was indispensable for war, and could be replaced by nothing, the evolution of the science, combining measures for enlisting sound men, for their physical and mental education and for the prevention not only of epidemics but of all diseases that render them ineffective, has made rapid progress. The system now in force, the result of the intervention of physicians and surgeons, to whom has been given official status, and who have been effectually supported by military men of broad and sympathetic mind, is nearly the same in all armies of civilized nations as in that of the United States.

First, there is the soldier, for the hygiene of the individual, compelled by regulations and orders to observe well-defined precepts and subject to routine inspections for their fulfillment; next, the squad in charge of a chief, a non-commissioned officer, who is responsible for the personal cleanliness of each member, for the police of the habitation, furniture, arms, equipment and of the clothing of the squad; then, the officer commanding the company, who is directed to inspect all of these daily, who has especial care of the preparation of food, and is the real effective power for the accomplishment of the obligations prescribed

by regulations and of all extraordinary measures ordered by the commanding officer of the garrison, regiment, etc., who, as a rule, acts by the advice or on the recommendation of the medical officers. These last, having supervisory functions, are required to be thoroughly conversant with all the details, technical and practical, of the science, the laws of which appear to be so simple and easy. A fair knowledge of the subject is imparted to all officers in the regular army some time in their career at the officers' schools. Many, the interests of their commands at heart, pursue further study of it. In the French army besides lectures to officers delivered by the senior surgeons, lessons in elementary hygiene are provided for non-commissioned officers to be given by the junior surgeons.

The whole plan is admirable and a great advance over that in use during the last century, which often degenerated into "pipe-clay," but it has its faults, here briefly stated.

1. Supposing all officers, military and medical to have a clear understanding of sanitation, the enforcement of measures of regulations or of occasional orders is apt to become, like drill, a perfunctory duty, except in the presence of epidemics; of others, acknowledged to be beneficial, to be desultory or neglected.

The non commissioned officers, who are in constant contact with the men, however intelligent, are not instructed at all and are deprived, in consequence, of methodical, uniform and properly guided habits of observation.

2. In very many matters, outside of the customary inspections, officers have to depend on the voluntary testimony of soldiers concerning evils. This is often withheld through indifference, is prompted by ignorance and prejudice, or is conflicting or interested, and, hence, a small error may become in time a grievous fault or even a public danger before it is reported.

3. Though all rules applying to the mass of men may be apparently obeyed, the personal element may nullify their effect. An example will elucidate this point. A barrack floor or wall may be pronounced clean after inspection and yet be soiled and made more dangerous to health by a little spittle than by dirt that would be more in evidence. It is more important, according to modern well-grounded medical opinion, that the habit of promiscuous expectoration be corrected than that the floors be mopped daily. Dislike to restrain the liberty of the individual, unless his actions are in flagrant interference with the health and

comfort of his neighbors, or unless it has become necessary to do so by reason of an epidemic, is universal in both civil and military life. By the German regulations, as by the French, the men are enjoined to cultivate a knowledge of such matters. Yet teaching and example alone are not efficacious among men differently impressionable, more or less governed by habits contracted in childhood, or by influences operating before enlistment, or possessed of inherited passions in various degrees. Now the soldier is always in a position to obey orders whether for his own or for the public good. To direct him there is need of a superior officer familiar with hygienic precautions and procedures, understanding their purpose or theory, of an observant mind, and, more than all, living with the men and thereby intimately acquainted with the ins and outs of their lives.

The remedy, therefore, suggested is a company non-commissioned officer, educated in the elementary principles of sanitation, to whom are attributed powers of inspection and execution, to cover the whole field of company hygiene.

In every company, troop, and battery one of the most intelligent sergeants, preferably a professional soldier, of cleanly and exemplary habits, should be selected and appointed "sanitary sergeant," who will not be relieved from any duties by reason of such selection.

A first sergeant may be designated, but another would be better, because modern advances have made sanitary matters too numerous and important for the first sergeant to superintend besides performing his military duties, which have also multiplied in recent years.

He should have direct supervision and charge of everything relating to the sanitary condition of the company, and his orders should be obeyed as coming from the captain, whose agent he will be in all such affairs.

His duties will be two-fold, to inspect and report infractions of hygienic laws to the officer commanding the company, who will decide upon further reference to the surgeon, and, to enforce the orders for their remedy.

He should have nothing to do with medical and surgical events, emergencies, other than what is required by present orders for all soldiers, nor should he wear the brassard at any time.

It would be well, however, that company bearers be selected

one from each squad, and these together with the non-commissioned officers in charge of the squads, should be, for military purposes, under his orders, constituting "sanitary squads." He should be responsible for the care of the company litters and appurtenances.

He should keep a tabulated book to contain the vaccination record of every man and past history in regard to all contagious and infectious diseases before and after entering the service, information to be furnished by the surgeons, and such other data affecting health as may be necessary; also, a bath register of body ablutions of every man, and a record of physical measurements after stated periods of gymnastic practice.

He should have charge of the effects of all deceased soldiers and make disposition of them according to the regulations after authority has been given by the surgeon, in order to carry out a measure necessary to prevent spread of contagious and infectious diseases, one not now in force because this source of disease has not been generally recognized.

A manual containing the essential principles of military hygiene and description of their application should be issued to him. He should, also, attend lectures in first aid and a more extended course of elementary hygiene by the surgeon than the present should be provided for him and the company bearers.

Consideration of the following particulars will demonstrate the advantage of this institution, by means of which more reliable reports will reach the commanding officers, because free from prejudice, based on information obtained not by leading questions, but by actual observation in barracks and field, such observations being directed in a scientific manner by reason of training, and by overhearing the comments of comrades.

Care of Person: Immoral and filthy habits, bathing of body, care of hair, physical exercise, over fatigue, preventive measures against sun and heat, against frost-bite, consumption of unripe fruit, especially on the march, malodorous persons who are not aware of their condition and are not at fault, loathsome chronic skin affections, malingering, abuse of quack medicines.

Clothing and Equipment: Cleaning, laundrying, airing, suppression of vermin, change of garments according to incident as well as at regular intervals, of bed linen, extermination of bed bugs.

Marches: Excessive use of water, defective shoes and footwear.

Venereal Diseases : Many cases do not reach the surgeon ; more would be noticed or suspected by a sanitary sergeant.

Alcoholism : Such an officer would make more truthful reports of this and other vices than are secured now mostly from the individuals concerned.

A sum of opinions that are of any value would be obtained by the proper officers in regard to

Clothing and Equipment : Its quantity, quality and fit or defects that interfere with free and healthy locomotion.

The possession of precise notions of all of these and the remaining subjects by those who both transmit commands and order on occasion would save much trouble and be of immense benefit.

Food : The captain could delegate to the sergeant the whole or partial management of the ration. Complaint should be made to him first, and, after investigation, he should present them to the captain, who, if he sees fit, may forward to the surgeon or to the commanding officer having authority to apply remedies.

Habitations : Entire police of company barracks, including water-closets and bath-rooms, stables and of grounds, to be the sergeant's especial charge, and defects or breaks in plumbing, ventilation, heating and lighting to be reported to and by him.

Camps : Proper ditching and draining of the whole ground of that covered by tents, orderly establishment of latrines, regulations for bedding, disposal of kitchen and other refuse, supply of drinking water, cleanliness of cooking and other utensils.

Extraordinary Measures : The direct charge of burial parties after a battle and of the sanitation of the field.

During *epidemics*, a sanitary sergeant would be invaluable to the surgeons, reporting to them any neglect or precautions recommended, suspicious cases, etc. The captain would have a more responsible and better trained non-commissioned officer than one selected for the occasion, upon whom to depend for the *immediate* isolation, disinfection, or destruction of personal clothing and bedding, according to the decision of the surgeons.

THE METHODS OF INFANTRY AMMUNITION SUPPLY IN FOREIGN ARMIES.

BY CAPTAIN C. S. ROBERTS, 17TH U. S. INFANTRY.

AN apology for writing on the subject which I have chosen may be due to you, since what I may have to say can hardly be unknown to any military student. The matter has been fully treated by Major Mayne in his "Infantry-fire Tactics," incidentally by Lieutenant Batchelor and other writers. The latest information I have been able to obtain I have found in the "*Bulletine de la Presse et de Bibliographie Militaire*," fortnightly magazine published in Brussels. To all these sources of information I am indebted.

It would certainly be more beneficial, and possibly more interesting, if I might describe the methods adopted by our own military authorities to supply our own soldiers, but unfortunately, if such a system has been devised, I am not aware of the fact. Certain plans appear to be in process of formation but it is yet too early to expect any definite results. The maxim "In time of peace, prepare for war," applies with greater force to all other nations and peoples than our own; indeed, it is not an exaggeration to say that in time of peace in our country all the efforts, with a few conspicuous exceptions, of our press and public men, seem to be directed to a thorough eradication of military spirit.

For these reasons, it becomes necessary for an officer interested in his profession to turn to the regulations in force in foreign armies for, practically, all information with reference to the equipment and supply of troops in the presence of the enemy.

With these remarks by way of introduction, I return to my subject. The difficulties of replenishing the supply of ammunition have become greater and greater in the ratio in which weapons have improved. The rapidity of fire being one of the essential factors of success upon the field of battle, the different powers have been forced to increase it to the greatest possible limit. After having replaced muzzle-loaders by breech-loaders, they have sought to further augment the rapidity of fire by the

use of magazines which are re-filled by cartridges in packages. We must therefore expect in future battles an enormous increase in the expenditure of ammunition. Whenever infantry has expended its ammunition, it loses the most powerful of its means of action. It follows that the supply, or constant supply, of troops with ammunition, during and after action, constitutes one of the most important duties of officers of every grade.

To the end that troops may be at all times in a condition to accept and sustain an obstinate battle, it is indispensable :—1st, that they carry upon their persons a large supply of ammunition, and, 2d, that the replacing of this supply be made without hitch or hindrance.

The supply for battle consists of the cartridges carried by the men and the reserve supply in the wagons which follow in close touch with the troops. In order to insure the uninterrupted replacing of ammunition, it is necessary :—1st, that the troops shall be followed by movable, reserve ammunition trains; 2d, that there shall always be a certain quantity of reserve ammunition at the point which serves as the base of operations, and, 3d, that the communication between the troops and the base shall be absolutely assured.

The means to this end employed by different armies is instructive and interesting, as evidencing the conditions, so far as preparation is concerned, which are considered absolutely necessary.

The ammunition habitually carried by the private soldier is as follows :

In the German army, 150 rounds per man.

In the French army, 120 rounds per man.

In the Austrian army, 100 rounds per man.

In the Belgian army, 180 rounds per man.

In addition to this allowance, the following amounts are carried in the company, battalion or regimental wagons, and the various reserve ammunition trains :

In the French army.

In the company ammunition wagons, 65 per man.

In the division ammunition sections, 69 per man.

In the corps ammunition trains, 48 per man.

In the army train or grand park, 110 per man.

In the German army.

In the company ammunition wagons, 50 per man.

In the corps ammunition column, 80 per man.

In the army park, 20 per man.

In the Austrian army.

In the regimental ammunition wagons, 42 per man.

In the division ammunition train, 57 per man.

In the corps ammunition train, 18 per man.

In the army ammunition train, 26 per man.

At the army depot, 25 per man.

In the Belgian army.

In the company baggage wagon, 14 per man.

In the battalion ammunition wagon and pack horses, 31 per man.

In the division ammunition train, 90 per man.

The supply of ammunition first available is that carried in the vehicles, by whatever name called, which follow next the troops on the march. It is laid down as a principle that a battalion should never go into action without its ammunition wagons. These wagons, or carts, differ somewhat in details of construction; the French and Austrian being similar to artillery caissons, consisting of a fore and hind part connected by a trail, carrying three movable chests in which ammunition is packed so as to be readily distributed. For more particular description, reference is made to Major Mayne's "Fire Tactics." In the German army the first available supply is carried in two-horse company wagons, in which ammunition is so packed as to be immediately available.

The drivers of the company or battalion ammunition wagons are in all armies detailed from the men of the battalions to which they belong, as are also the men who attend to the loading and distribution of the ammunition. The non-commissioned officers in charge are specially selected, and all have a thorough preliminary training in all details pertaining to their duties. As showing the scope of this instruction: The non-commissioned officers and men are instructed in the nearest field artillery batteries, with which they remain for four weeks, and learn to equip, load and conduct ammunition wagons, and specially all that relates to the replacing and distribution of ammunition during and after a fight; the drivers and orderlies are attached for five months, either to the cavalry or field artillery batteries nearest their station, and are carefully instructed in every detail of their duties.

The reserve ammunition (and by this I mean all ammunition

except that carried in company or battalion wagons) is transported in regularly organized ammunition trains. These trains, by whatever terms designated, are practically the same in all armies. In the German service to each corps there are ten ammunition columns, four containing infantry ammunition. Each infantry column has twenty-one wagons of infantry ammunition. The ammunition columns are divided into two echelons, each containing two infantry ammunition columns, one for each division. The 1st echelon marches near the troops, and its supply of ammunition is at once available; it carries forty cartridges per man. The 2d echelon marches with the train in rear, and carries the same amount of ammunition; it is to replenish the supply of the 1st echelon, and is in turn supplied by the army ammunition columns or from fixed depots.

In the French army the 1st echelon is divided into six sections. The first two sections carry infantry ammunition, one section for each infantry division, and contain 69 cartridges per man. The organization is in the charge of the artillery.

Each section (infantry) consists of

32 4-horse infantry ammunition wagons.

1 4-horse forage wagon.

1 6-horse forage wagon.

3 2 horse provision wagons.

1 4 horse battery wagon.

The personnel of each section is as follows:

1 captain, 2 lieutenants, 1 quartermaster, 6 assistant quartermasters, 1 chief artificer, 1 quartermaster sergeant, 6 foremen, 1 farrier with 2 assistants, 2 blacksmiths, 2 carpenters, 6 pyrotechnists, 2 harness-makers or saddlers, 2 trumpeters, and about 150 teamsters.

The 2d echelon is divided into four sections. Each of the first three carry 15 wagons of infantry ammunition, a total of 48 cartridges per man, and is for the replenishing of the supplies of the 1st echelon. The second echelon draws its supplies from the "army park," which at all times is supposed to have available 110 rounds per man of infantry ammunition. It is composed of five echelons similar to the second, and is under the command of a colonel of the supply department.

A total for the two echelons, over 400 wagons and 2600 men and officers for each corps. (The army park, 900 wagons and 7560 men and officers.)

As illustrating the thoroughness of preparation, even among the smaller states of Europe, I will now refer to the regulations in force in the Belgian army, the peace establishment of which consists of 34,000 infantry. As has been noticed, each infantry soldier carries 180 cartridges (weight 13 lbs.). Each company war strength 250, has a baggage wagon which carries 3360 cartridges, or 13.44 per man, and, in addition, each battalion is followed by a wagon containing 26,880 cartridges, and two pack horses each carrying 2100 cartridges, a total for each battalion of 31,080 cartridges. Each division has two ammunition trains, one of 21 wagons, and the other 20 wagons, of infantry ammunition, each wagon containing 26,880 cartridges.

During the march the battalion ammunition wagon follows immediately behind its battalion, and the company with the baggage train. The ammunition trains keep close touch with the troops. On the march they are part of the train *du combat*, and follow the ambulance train, halting outside the danger zone. When battle is imminent, as much ammunition as can be carried is issued to the men. This is taken from the supply carried in the company and battalion wagons. While awaiting the arrival of the division ammunition team, it is permitted, if necessary, to issue the ammunition belonging to troops not engaged (from their battalion wagons). At the beginning of a battle, the battalion wagon, which has been re-supplied if previously its supply had been distributed, and the pack horses, take post under cover in rear of their battalion; if possible, within 500 metres of the firing-line. When firing begins, the pack horses are brought as near as possible to this line, and continue to move backwards and forwards from the line to the wagon. If the terrain permits, the wagon is driven close up to the line of fire. A number of men are detailed from each company to take cartridges from the chests carried by the pack horses, or in certain cases from the ammunition wagon, and distribute them along the line. The cartridges of the dead and wounded are distributed among the nearest combatants, or piled in bunches near the line. When the supply in the wagon is exhausted, it is immediately refilled from the advanced wagons of the division train, and returns to its position in rear of its own battalion.

The German Regulations prescribe that when a serious engagement is expected the senior officer with the troops orders the division ammunition trains to advance to proximity with the

troops, and a portion of this train is brought to the field of battle. The troops engaged are immediately notified of the location of the train, which is required to immediately fill all demands. When infantry are deployed for action, the cartridges carried in the company wagons are distributed among the men. They are carried in their haversacks, trousers, and coat-pockets, etc. These wagons are immediately re-filled from the division train, and return to the battle field *terrain du combat*, taking position under cover, in rear of and a short distance from the firing-line. In urgent cases, they are to be driven up to the firing-line, without regard to danger. The cartridges of the troops engaged are replenished, so far as possible, by reinforcements as they arrive on the line. If it is necessary to send an extra supply to the firing-line, men are detailed from the reserves for this purpose, the men so detailed remaining with the firing-line. This is the universal rule—troops are never relieved at the front because their cartridges are exhausted. It is prescribed in regulations that the cartridges of the dead and wounded shall be gathered and distributed. Officers as well as men are expected to take advantage of all opportunities to replenish their supply. It is not necessary to await orders. Not only should the men have the regulation allowance, but it is required that they shall have as much as it is possible for them to carry.

If at the beginning of an engagement the troops are on the defensive, especially when in a prepared position, there should be large supplies distributed along the lines, in boxes.

It should be noted that ammunition for distribution during battle is in packets which fit the rifle or magazine and can be instantly attached. These packets before being placed in the ammunition chests are packed in bundles wrapped in canvas, each containing 40 packets, or 200 cartridges. Attached to the bundles are strong loops, enabling them to be readily carried by the men charged with the duty of distribution.

It seems unnecessary to pursue this inquiry further, and I will only remark that the methods in other European armies are similar to those I have endeavored to describe. It may also be added that the whole subject of ammunition supply is carefully taught in connection with the closing exercises in battle shooting, and carried into actual practice in the annual manœuvres.

It is to be hoped that the importance of this matter may be so impressed upon Congress by our military authorities that

some action may be taken with reference to the organization of ammunition trains, and indeed a complete train service, that war may not find us entirely unprepared in this most essential feature of military organization.

A PROPOSED SCHEME FOR SECURING UNIFORM EXAMINATIONS FOR THE BATTERY COMPETITION.

BY FIRST LIEUT. E. A. MILLAR, 3D U. S. ARTILLERY.

THE "battery competition" prescribed by paragraph IV of G. O. No. 41, A. G. O., Sept. 4, 1896, is "of the nature of a competitive examination conducted by the board under such rules as it may deem best for the attainment of the object of the competition, which, however, must be thoroughly practical in character." "The object of the competition is to determine in *each battery* the classification of gunners and gunnery specialists by their absolute and relative excellence in apprehending and mastering the prescribed instruction."

When the examinations are finished the competitors are to be classified as 1st, 2d or 3d class gunners and gunnery specialists, and it has been the custom to publish in orders their names, classification and averages. Under existing circumstances the published averages are relative only in each battery but do not show the comparative excellence of the competitors of other batteries or regiments because the examinations and standards of marking are probably very different. The only instructions in regard to the examination are that it shall include the subjects laid down in the schedule of "minimum qualifications" and be practical in its character. The ideas as to what are, or are not, practical questions will cause differences in the examination as held by each board.

As this has been made a competition would it not be desirable to have the published averages show the relative standing of all the competitors in the subjects of the examination?

The object of this paper is to show how this may be approximately accomplished by means of a prescribed examination on subjects of instruction that can be given with the equipment which has been furnished all artillery posts.

The instruction should cover all the opportunities and facilities of the posts where the batteries may be stationed, but the

competition should include only those subjects in which all the competitors have been instructed. Credit should be given for excellence in all subjects of instruction which are not included in the competition ; this might be done by stating after the competitors' names, in a column of remarks, the additional subjects in which they are proficient.

The questions for the prescribed examination should be published in time to allow for thorough instruction and should be prepared by a board of officers convened preferably at the Artillery School where there are representatives from the different regiments.

The list of questions should be revised from year to year in accordance with practical suggestions made in the reports of the examining boards and be made to conform to the various changes in facilities of instruction. For the purposes of this examination and for general instruction a uniform and detailed system of vessel-tracking should be established which is applicable to the observing instruments and means of communication used at the different posts. A complete list of authorized gunnery terms and definitions is desirable, applicable not only to range table conditions where the piece and target are considered on the same level, but also to the usual conditions where the piece is at varying heights above the target.

With a prescribed examination the averages reported by the different boards would be approximately relative, the officers in charge of the instruction would have a guide on which to base and devise the various methods of imparting it suited to the needs of the competitors, and the competitors, having been drilled in the questions, should understand them.

The following questions are submitted as examples of what might be prescribed for an examination on the subjects included in the schedule of "minimum qualifications" for gunners and gunnery specialists.

Numbers, angles, distances and letters of observing stations are indicated only. These are to be designated by the examining board, and those referring to base lines should conform to the conditions existing at the place where the examination is held. The number after each question is its value. The maximum value of questions to be asked a competitor under each heading is the number given in the column of maximum figure of merit of the schedules.

GUNNER'S EXAMINATION.

1. *Use of Angle Measuring Instruments.*—A. Azimuth Circle. Prepare the instrument for use at — to take angles from the base line —. (Value 5.)

The instrument being in adjustment, the gun angle of — is what? (1.)

Considering — as the splash of the shot, what is the shot angle? (1.)

Considering — as the target, what is the target angle? (1.)

Considering the line of zeros to have been out — minutes, correct the angle. (1.) (Note. Form 31 d.)

The station at the other end of the base line is not visible from the instrument at —, but the angle from the base line to the visible signal at — is — degrees — minutes, adjust for taking angles from the base line. (5.)

The azimuth of the base line looking from — is — degrees — minutes. Adjust the instrument for taking azimuths. (5.)

The instrument being in adjustment, take the azimuths of —, —. (1 each.)

Take angles to moving object —. Ready — two — take —. Ready — two — take —. Ready — two — take. (Maximum value for interval of 20 seconds between "takes" exclusive of the time taken by the examiner for verification.) (10.)

B. Transit. Prepare the instrument for taking angular deviations in rear of the — piece, considering — as the target at — yds. (5.)

Considering — as the splash of the shot, what is the deviation? (1.)

The deviation is — minutes R (or L), what is the deviation in yds? (1.)

Target — yds, deviation —, minutes —? (1.)

Prepare the instrument for taking deviations in points. (5.)

Considering — as the target, set the micrometer for — points. (1.)

C. Circular Protractor. Place the protractor in the proper position at — for laying off angles from the base line —. (5.)

Draw a line through —, making with the line — an angle of — degrees — minutes. (1.)

The azimuth of the line— is — degrees — minutes. Set the protractor at — for laying off azimuths. (5.)

Draw lines through — whose azimuths are —, —, and —. (1 each.)

D. Sights. Set the sight for the — piece at — degrees — minutes. (1.)

Gunner's quadrant (old style) for use with the long arm across the face of the piece. Set for — degrees — minutes. (1.)

For use with long arm in the bore, set for — degrees — minutes. (1.)

New style. Set and show how the instrument would be placed on the piece for giving a quadrant angle of — degrees — minutes. (1.)

2. *Use of Plotting Board.*—The angles being measured from the base line —, adjust the protractors. (5.) The gun angles of the — piece are; from —, — degrees — minutes and from —, — degrees — minutes.

The target angles are: from —, — degrees — minutes and from —, — degrees — minutes. Give the distance from piece to target. (1.)

Taking the above as the target, the shot angles are; from —, — degrees — minutes and from —, — degrees — minutes. Give the deviations. (1.)

The azimuth of the base line looking from — to — is — degrees — minute the length of the base line is — yds. adjust the protractors for laying of azimuths. (5.)

The azimuth of the — piece from — is — degrees — minutes and from — is — degrees — minutes. The azimuth of the target from — is — degrees — minutes and from — is — degrees — minutes. Give the distance of piece to target. (1.)

Shot No. 1. Azimuth from —, — degrees — minutes. From —, — degrees — minutes. Give the deviations. (1.)

Locate a target on the board at — yds. from a piece at — and in a convenient position in the field of fire. Determine the azimuth of this target from the piece and observing stations — and —. (2.)

The angles to the first position of a moving target from — is — degrees — minutes and from — is — degrees — minutes. Second position from — is — degrees — minutes and from — is — degrees — minutes. Third position from — is — degrees — minutes and from — is — degrees — minutes. The intervals between the observations being 20 seconds, plot the probable position of the target at — minutes from the first observation and

determine the range and azimuth of this position from a piece at—. (10.)

3. *Service of the Piece.*—"The examination may be oral at the gun or the competitor may be required to drill a gun detachment in the service of the piece."

The examination should be preferably only at the piece the service of which has been assigned to the battery to which the competitor belongs.

Post the detachment at the piece. (2.5.)

Give the names, uses and positions of the implements. (2.5.)

Distribute the equipments. (2.5.)

Give the commands and explain the duties of No. — in —. (5.)

How and by which cannoneers is the ammunition brought up? (5.)

Give the names and point out the parts mentioned in the service of the piece. (5.)

State the kind of piece, calibre, kind of powder, weight of charge and I. V. under standard conditions. (5.)

What precautions can be taken in preparing the ammunition and in the loading to secure uniform densities of loading? (5.)

What kinds of projectiles are used with the piece? What are their weights? (2.5.)

What kinds of fuses are used? Describe their action. If time fuse set for — seconds. (5.)

Prepare the plug for taking pressures. Having the table of pressures and the calipers find the pressures corresponding to the cylinder—. (5.)

4, 5, 6, 7. *Judging Distances, Speed, etc.*—The competitors are to be assembled at the piece to the service of which they have been assigned and are given a pencil and card, of the form which follows, on which they write their place, date, name and rank. The examiner calls out Distance to — stationary object.

No. 1 — take. Distance to stationary object—No. 2 — take etc. (2.5.)

Distance to — moving object No. 1. Ready — two — take.

Distance to — moving object No. 2. Ready — two take, etc. (2.5.)

Speed of — No. 1. Ready — two — take.

Speed of — No. 2. Ready — two — take, etc. (2.5.)

Velocity of wind — take. (2.5.)

The objects under headings 4, 5 and 6 should, as far as practicable, be in or near the field of fire of the piece.

As each of the above is called out the competitors write in the proper places their estimates of what is required. Under 4 estimates should be made on the regular harbor buoys or other marks and also on the tug or barge which has been directed by signal to stop in positions in the field of fire of the piece. Under 5 and 6 estimates may be made while the tug is moving to the designated positions or advantage may be taken of any passing vessel.

In order to determine the correctness of these estimates the examiner's directions to the competitors are simultaneously communicated to the range-finding party which determines instrumentally the required data.

GUNNER'S EXAMINATION, 4, 5, 6 and 7.

Fort —————
 ——— —, 189—.

—————Battery —, — Arty.

Distance to stationary object,	No. 3. ————— yds.
No. 1. ————— yds.	Speed of —————
No. 2. ————— yds.	No. 1. ————— miles per hour.
No. 3. ————— yds.	No. 2. ————— miles per hour.
No. 4. ————— yds.	No. 3. ————— miles per hour.
No. 5. ————— yds.	Velocity of wind.
Distance to moving object	No. 1. ————— miles per hour.
No. 1. ————— yds.	No. 2. ————— miles per hour.
No. 2. ————— yds.	No. 3. ————— miles per hour.

8. *Laying Guns.*—Lay the piece in accordance with the following:

Target —, elevation —, allowance — (5.)

Target —, elevation —, and a total allowance corresponding to, allowance for wind — points —, drift — points, and for movement of target during the time of flight — points — (5.)

Quadrant angle — degrees — minutes, azimuth — degrees — minutes (5.)

Quadrant angle — degrees — minutes, azimuth of predicted position of target in — minutes — degrees — minutes, allowance for wind — minutes, for drift — minutes, time of flight — sec.

onds. Lay the piece and give the command fire at the proper time (10.)

As this is considered the most important part of the examination several examples of the foregoing problems should be given each competitor.

9. *Use of Range Tables.*—The examination under this heading is restricted to "only such simple problems as are likely to come within the province of a gunner."

It would be desirable to have more definite instructions in this section as other paragraphs of the order prescribe that at target practice the calculation shall be made by the officer in charge of the gun while the duty of the gunner is to adjust the sight and sight the gun.

The following are submitted as simple problems in distinction to the more difficult ones to be given under heading (d) of the gunnery specialist's examination. The terms used are from Mackinlay's "Gunnery."

1. Angle of elevation=angle between line of fire and line of sight.

2. Quadrant angle=angle between line of fire and horizontal.
1=2 when target and piece are on same level.

3. Angle of projection=angle between line of sight and line of departure.

4. Angle of departure=angle between line of departure and horizontal.

3=4 when target and piece are on same level.

Angle of sight=angle between line of sight and horizontal.
(Also by Capt. Bruff, p. 347 "Text-book of Ordnance and Gunnery.")

Angle of projection — jump=angle of elevation.

Angle of departure — jump=quadrant angle.

When target is below piece quadrant angle=angle of elevation — angle of sight. (For practical purposes within usual existing conditions.)

Distance to target — yds. 1st shot with angle of elevation of — degrees — minutes went — yds., 2d shot with angle of elevation of — degrees — minutes went — yds. What angle of elevation should be used for the 3d shot? (2.5.)

Distance to target — yds. 1st shot with angle of elevation of — degrees — minutes and — points allowance — went — yds. and — yds. R (or L), 2d shot with angle of elevation of — degrees

— minutes and — points allowance — went — yds. and — yds.
— Give the laying for the 3d shot. (5.)

Examples from tables of fire by Lt.-Col. Rodgers (Artillery memoranda No. 1, A.G.O. 1893). Table for — gun pp. — and — Range — yds. Wind — mile at III (or IX). Give the the angle of departure and allowance. (5.)

a. Taking the jump as — minutes, what is the angle of elevation? (5.)

b. What is the quadrant angle when the angle of sight is — minutes? (5.)

c. With the laying as determined in *b* the shot goes — yds. over and — yds. —. Give the laying for the next shot. (2.5.)

Examples from tables of fire by Capt. Ingalls (Artillery memoranda No. 1, A.G.O. 1896). Range table for the 8" B.L.R. Examples 1 and 3, page 3.

Range table for the 10" B.L.R. Examples 3 and 4 pages 8 and 9. (5.)

Range table for the 12" B.L. Mortar Range — yds. with a charge of — pounds — powder, what is the quadrant angle and time of flight? (5.)

10. *Cordage, Blocks and Tackle and Mechanical Manœuvres.*— Cordage. How is the size of a rope given and how is it measured? (2.)

Point out *a* bight and *the* bight of the rope. (2.) Seize two parts of a rope. (2.)

Mouse the hook of a block. Put on a nippering. Whip the end of a rope.

What is a strap and how is it used? (2.)

Knots. Make the — knot. For what purpose is it used? (Figure of eight, reef or square, bowline, bowline on the bight, anchor, single wall, wall and crown, drag rope, man harness.) (1 each.)

Bends. Make the — bend. For what purpose is it used?

(Sheet, double sheet, carrick.) (1 each.)

Hitches. Make the — hitch. For what purpose is it used?

(Half, two half, clove, timber, rolling or stopper, single and double blackwall, sheep shank, cat's-paw, marline spike.) (1 each.)

Splices. Name the splices and tell where they would be used. (1.)

Lashings. Make the shear lashing for raising light weights. Make the shear lashing for raising heavy weights. In these lash-

ings which are the racking, riding and frapping turns? (2 each lashing.)

Lash the hook of a block to a spar. Put on a strap for lifting a box. For lifting a barrel with one head out? (2.)

Blocks and tackle. Reeve the — tackle and show how it can be used to the best advantage in lifting and in hauling. (Gun garrison gin, luff, single Burton, double Burton, luff upon a luff, whip upon a double Burton, luff upon a double Burton.) (1 each.)

Mechanical manœuvres. Give the relative positions of the parts and distances to be observed in the use of shears. (1.) Go through the motions of lifting with and trip the hydraulic jack. (1.)

With the weight suspended shift the fall on the windlass of the gin. (5.)

Place the blocks for dismounting the 10" S. B. gun. (5.)

Place the sling on the — piece for dismounting with the gin. (5.)

Reeve and place the tackle for moving the 15" S. B. gun on the cradle. (5.)

GUNNERY SPECIALISTS EXAMINATION.

1. *Communications.*—(a) *Telegraphy and Signalling.* In order to qualify the competitor must be perfect under this subhead the rate required being 5 words per minute with flag and torch and 10 per minute by telegraph. The messages should be those customarily used at target practice and vessel tracking. Authorized abbreviations are to be used and all messages recorded.

Take angle to target No. 1. Check zero line. Zero line at last observation was out plus — minutes. Take angles on steamer with red band on stack coming in. Ready — two — take, etc.

Target angle is — degrees — minutes, etc.

(b) *Batteries, lines and instruments.* The following questions are on subjects of instruction given in Artillery Circular "C," Lieut. Geo. L. Anderson, 4th Artillery.

Batteries. Set up a gravity cell. (10.) Inspect and report the condition of the battery used on the post telegraph line. (10.) Remount the cells that require it in a battery. (10.) Connect — gravity cells into a battery. (10.)

Lines. For the purpose of the examination a short line can be used and faults which can be readily repaired should be made

by the examiner. Repair a break in a telegraph line. (10.) Attach the line to pole insulator. (10.) Trace a fault (one in the line). (10.) Erect a portion of the line between — and —. (10.)

Instruments. Connect in circuit a battery, key and sounder. (5.) Connect a key, sounder, relay and batteries showing the main and local circuits. (10.) Trace faults due to bad connections. (10.)

Communication by telegraph only is contemplated in the schedule, but at many posts the telephone is used, in that case similar questions to the foregoing could be taken from paragraph VI, p. 49, Artillery Circular "C."

Use of Meteorological Instruments and Range Table Work.—(a) Connect in circuit a battery, bell and anemometer. (10.)

The connection pins on the dial of the anemometer being at the numbers representing miles, what is the velocity in miles per hour when the interval between rings is — minutes? — minutes — seconds? etc. (10.)

The anemometer for use with the Marvin register makes connection at $1/20$ miles. When this anemometer is used with a bell and the interval between rings is — seconds, what is the velocity in miles per hour? The anemometer is being used without the bell and the reading on the dial is 1.8, 5 minutes afterward it is 3.4, what is the velocity? (10.)

The reading is 9.6 and in 6 minutes it is 2.2, what is the velocity? (1.)

(b) Adjust the scale and make readings on the mercurial barometer. Make readings on the aneroid barometer. (10.)

(c) Make readings on the thermometer. (10.)

(d) Range table work. The tables available are those of Lieut.-Col. Rodgers and Capt. Ingalls published in the Artillery memoranda.

The tables of wind coefficients by Lieuts. Whistler and Ruckman and of the I. V. corresponding to different densities of loading (8" C. R.) published in the *Journal of the U. S. Artillery*. Table III Ingalls' Handbook. Table of tangents (to determine the angle of sight). Table of wind components, form 31 1. Graphic tables.

Problem I. Given — piece, charge — lbs. — powder, projectile —, — lbs., distance to target — yds., I. V. — f. s., bar. — in., ther. — degrees, wind — miles at 9 o'clock, jump — minutes.

FORM ON WHICH TO CALCULATE THE RANGE TABLE PROBLEMS.

Data. Gun.	Elevation.	Corrections.		Deviation.		Points.	
		+	-			R	L
Wind miles o'clock.	Component \times = Coefficient \times =			Wind miles o'clock.	Component \times = Coefficient \times =		
Range.	Corrected range =			Drift.			
				Movement of target.			
I. V.							
					Total allowance.		
Bar. Ther.	See note. $\frac{\delta}{\delta} =$			r' in azimuth = $\times \times .000291 =$ Allowance in azimuth = Azimuth of target = Laying in azimuth =			
Wt. of projectile.				Angle of fall.			
				Time of flight.			
	Total correction.						

$\phi =$
jump =
Angle of elev. =
For diff. of lev.
Quadrant angle: =

NOTE.— $\Delta\phi$ for ΔC in using Rodgers' Tables for 8" C. R. with shot

$$\frac{\left\{ \frac{\delta}{\delta} \times \text{wt. of proj.} \right\} - 180}{18} \left\{ \Delta\phi \text{ for } \Delta C = 1/10 C \right\}$$

Required the angle of elevation and allowance. (Variations in X, I. V., C. and effect of wind across the line of fire.) (25.)

Problem II. Given — piece, charge — lbs. — powder, projectile —, — lbs., distance to target — yds., I. V. — f. s., bar. — in., ther. — degrees, wind — miles at — o'clock. (25.) (Varia-

tions in X, I. V., C. effect of wind in range and deviation, drift and jump.)

Problem III. Given 8" C. R., charge 35 lbs., Hex. powder, Butler shot 182 lbs., when loaded the base of shot is 7.96 ft. from the face of the piece, bar. -- in., ther. -- degrees, wind -- miles at -- o'clock, distance to target -- yds., height of piece above target -- ft. Required the quadrant angle and allowance. (50.) (Variations in X, I. V. due to density of loading. C. effect of wind, jump, drift and height of piece above target.)

Problem IV. Those given in Artillery Memoranda No. 1, 1896.

Problem V. 12" B. L. Mortar charge 51 lbs. V. M. powder, quadrant angle 52 degrees, target 3 and 1/2 miles, azimuth -- degrees -- minutes. The shot with the above laying went 150 yds. over and 60 yds. R. Give the laying for the next shot. (25)

Form 31m or that on page 563 will be found convenient for use with these problems.

A SKETCHING BOARD.

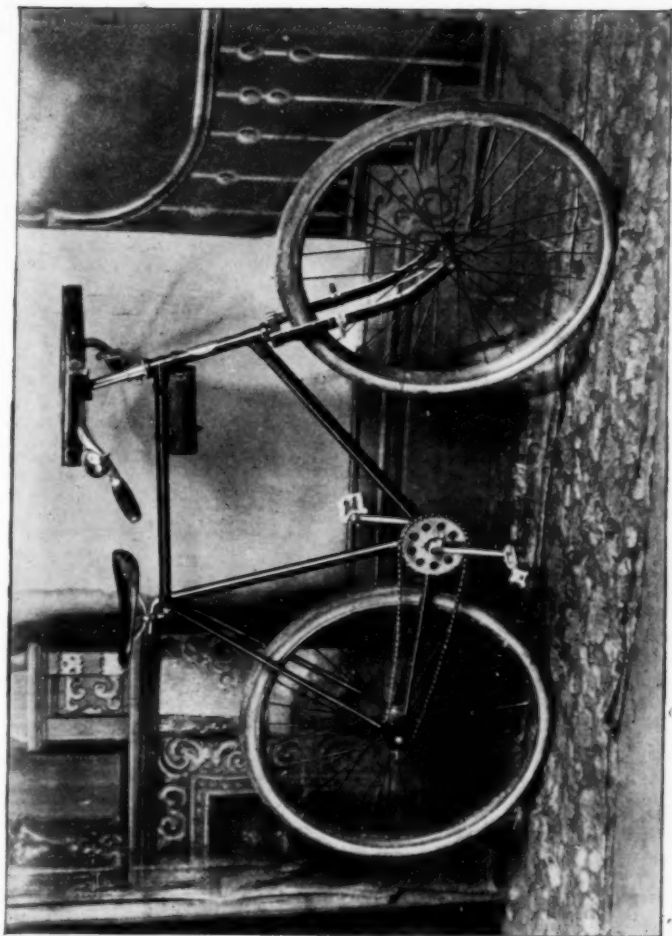
BY LIEUT. JAMES A. MOSS, 25TH U. S. INFANTRY.

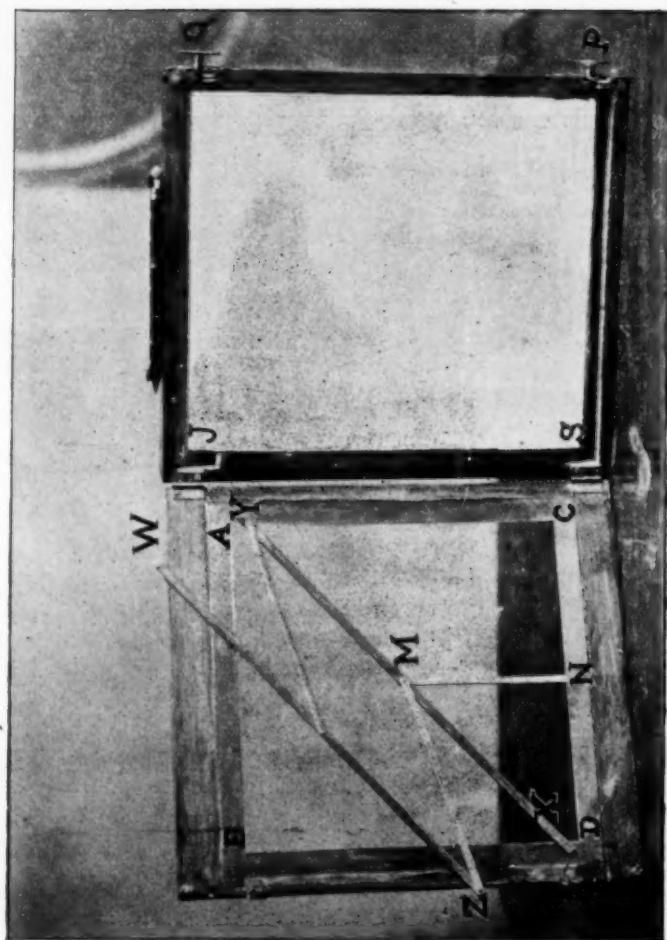
THESE illustrations represent a compact and simple sketching board.

ABCD, a graduated metallic square circumscribed about a circle whose centre is at M; JQ and SP, two cylinders around which paper is wound; XYZW, a parallel steel ruler which moves about a pivot at M; NM, a steel arm to which the parallel ruler is attached.

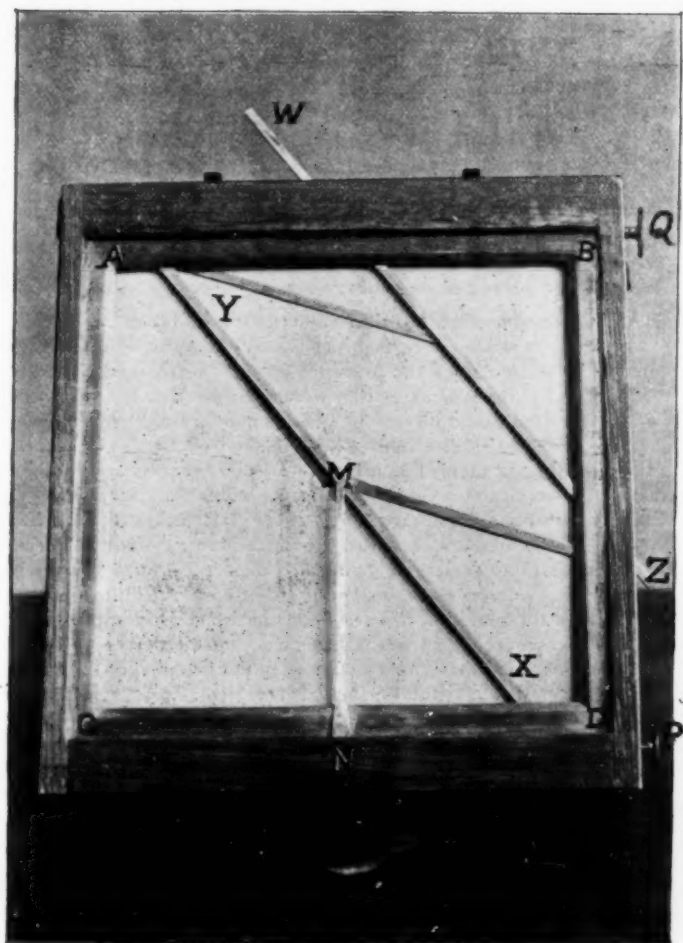
In order to illustrate its use, let us suppose the reading from the prismatic compass is N° , and the map-maker is at T, any point within the square ABCD: Bring the centre line of the arm, XY, of the parallel ruler, to N° , and holding it there with one hand throw out the other arm, ZW, to T: This gives the direction of the course, the length of which is laid off according to the scale of equal parts on the arm, ZW.

The body and top are made of hard wood, and a water-proof cover is used in case of rain.





This sketching board is used to best advantage on a bicycle, although it may be properly fastened to the pommel of the saddle and used on horseback, or it may be carried in any convenient manner and used on foot. In either of the last cases the compass may be attached to the board. When used with the bicycle the sketching board is fastened to the handle-bars by means of two thumb clamps, and the distances travelled, in miles and fractions thereof, are read directly from the cyclometer. In this



case, however, on account of the iron of the bicycle, the compass cannot be attached to the board, and every time a reading is taken, the rider should lay his bicycle on the ground and step a few yards away. On fairly good roads, a section of country can be mapped much more accurately, in about one-third the time it could be done on a horse, using the regulation topographical note-book.

Reprints and Translations.

WAR AND CIVILIZATION.

BY THE COMMANDER-IN CHIEF, LORD WOLSELEY.

(From the United Service Magazine, London.)

I HAVE selected a great, a serious subject for my address this evening, which I hope you may not find wearisome. Many an erudite treatise might be written upon the influence of war on civilization, and the number of three-volume novels which already deal with the social side of this question would fill the shelves of a goodly sized book-room.

It is, however, too large a subject to allow me to do more on this occasion than touch upon some of its aspects. My chief concern to-night is to put before you certain views as to the influence which the civilization of the present day has upon the military policy of the great States of Europe. I refer chiefly to the measures and the general military system adopted by those nations in their anxiety to be at all times ready for war upon the shortest notice. I desire also to call your attention to the influence which those measures are calculated to have upon the welfare of the people concerned. The extent to which war has affected human progress regards the past, but the considerations which I propose to put before you this evening are of living importance to the world at this moment.

That nations should always be prepared for immediate war is now recognized as a first necessity by all the great Continental Powers. This is a remarkable feature in the stage of civilization we have now reached, and is one of the results of the extraordinary advances made by science in the last half century. The facility and rapidity of communication afforded by steam and the electric telegraph, and the precision and astounding effects of the arms now in use, have rendered necessary this constant preparation for war. The object now most carefully attended to by the rulers of these States is to utilize for purposes of war all the manhood and all the resources of the nation, and to be able to mobilize them with the utmost rapidity.

That is the first point to which I wish to call your attention. The second is to show you that the machinery created for this purpose of rapid mobilization, and kept at all times in the most perfect order, is calculated to exercise an important and permanent influence upon the national life and welfare of those great States and upon civilization in general.

All healthy civilization engenders a strong national feeling, and develops a pride of race and a keen desire to see one's country great and powerful. Cosmopolitanism, on the other hand, according to the ardent patriot's views, is the growth of an unwholesome civilization, the deduction of a spiritless and unpatriotic philosophy.

Speaking here in Scotland's capital, I need not enlarge upon the merits of patriotism and love of country. They are in born instincts and qualities of the Scotch national character, and have helped to make Scottish history what it is. If I notice them, it is because I think, however different may be our views of this extraordinary spectacle of armed Europe standing ever ready for battle, all must recognize the sacrifices willingly made by these foreign nations for an object which they, one and all, believe to be essential for their national existence.

Towards the end of Queen Anne's reign, under the influence of strong party feeling, we were about to make what many believed was an undesirable, a discreditable peace. I find in a letter of that time Richard Steele expressing the hope that his writing may "rouse in this divided nation that lost thing called public spirit." I want you, my hearers, to understand that it is public spirit and love of country and pride in its greatness that now induce the great Continental nations to bear the burden which this constant readiness for battle imposes upon them. I wish you also to realize that heavy as that burden may be, it is in itself an invaluable species of national education, both physical and mental, for all classes, and that it serves and forwards, however undesignedly, some of the best interests of civilization in their highest aspect.

In the course of my remarks I shall have to speak of war from other points of view than those from which you, perhaps, are accustomed to regard it. To a large proportion of the world the very word "war" is repellent because it is only thought of in connection with its inevitable horrors.

I should like to read to you a short extract from the writings, not of a soldier but of a philosopher and a man of peace—I refer to Mr. Ruskin. It will show you the impression which the study of history made upon one of the most thoughtful and cultivated minds of our generation. He says:

"The common notion that peace and the virtues of civil life flourished together I found to be wholly untenable. Peace and the vices of civil life only flourish together. We talk of peace and learning, and of peace and plenty, and of peace and civilization; but I found that those were not the words which the muse of history coupled together; that on her lips the words were—peace and sensuality,—peace and selfishness,—peace and death. I found, in short, that all great nations learn their truth of word and strength of thought in war; that they were nourished in war and wasted by peace; taught by war and deceived by peace; trained by war and betrayed by peace—in a word, that they were born in war and expired in peace."

Now these are words which deserve to be well considered. What Mr. Ruskin, I think, means us to understand is, that peace has its dangers, very great dangers, to the moral well-being of men and nations; and that war, rough nurse as it is, has brought out some of the better, hardier and truer qualities of human nature.

Again, in another passage regarding the arts of peace, he says:

"All the pure and noble arts of peace are founded on war; no great art ever yet rose on earth but among a nation of soldiers. There is no art among a shepherd people if it remain at peace. There is no great art possible to a nation but that which is based on battle."

Had this been written by a soldier, many would have denounced him, but coming from Mr. Ruskin, the man of peace, it will, I am sure, meet with a more generous reception.

War is so terrible a scourge in itself, and is attended with such scenes of horror, that all who have ever witnessed them must shudder at their bare remembrance. Violence and death are in its right hand; destruction and desolation are its handmaids, and behind it follows a ghastly train of suffering, sickness, misery and mourning.

I know something of war's horrors from personal experience, and no man loathes them more sincerely. Where indeed is the educated and humane man in any civilized nation who does not wish that all war should become impossible. Is it not one of our most cherished spiritual longings that the Great Being who once said, "Let there be light," should now say, "Let there be peace for evermore"? But until those blessed words be spoken, do not let us live in a fool's paradise, believing that wars will cease. We are warned by all nature around us, which is always at war, as well as by revelation, that no such happiness can be ours under the present dispensation.

I should be very sorry if anything I may say here this evening could be twisted into a seeming approval of war. But yet I cannot forget that, "as out of the strong comes forth sweetness," so war with all its evils calls out and puts to the proof some of the highest and best qualities of man. Fearlessness, daring, endurance, contempt of death, self-sacrifice, readiness to die for country or some other sacred cause—all these are virtues which have often saved nations when at their last gasp.

War in itself, in its nature, must often come into conflict with the best agencies of civilization. This must necessarily be the case, for civilization may be said to presuppose a people busied in enlarging the common stock of everything that is most calculated to benefit human nature. It fosters art, science, literature and all that enlarges the scope of man's earthly enjoyment. It means a people living with great individual liberty in a condition of peace and established order. But where war rages, all these enjoyments and advantages either suffer or are temporarily suspended. The will of the commander takes the place of law, industries are more or less interrupted, and all social progress is checked.

Yet, without doubt, many wars further the best interests of humanity—wars, for instance, with barbarous nations—and it is curious to note that, as historians now tell us, the whole spirit of modern liberty had its origin with the rude and barbarous hordes which destroyed the Roman empire. History tells us also that upon many occasions when nations had begun to decline and to deteriorate in fibre, war has often acted as a sharp corrective of sloth and luxury and that want of national spirit which is the outward sign of internal decay.

"Peace on earth and good-will towards men," the ideal condition of human existence, is the dream of a better world. We earnestly wish for its realization. Let us pray for it with heart and soul; but until the Prince of Peace comes once more amongst us, any nation that means to be great and to hold its own against all comers must be ever ready for war with all its

attendant horrors. Let us never forget that of the Lord of Hosts, the Lord of Armies, it is written : " In Righteousness He doth judge and make war."

War always has been and always will be the final court of appeal between nations. No form of government can secure you an immunity from it if you are determined to hold your own as an independent people. The longest and most deadly and by far the most costly of all modern wars was waged in a republic—I refer to the civil struggle between the North and South in the United States of America. It had its peculiar horrors, and they were terrible. In passing, may I ask you to note one peculiarity about it? No regular army fought on either side. It was carried through by troops whose rank and file were by no means better, if as well trained as either our militia or volunteer forces.

In our cities, in our homes, we strive to protect ourselves and families from disease by sanitary precautions, and science helps us much in doing so. But, act as we may, we cannot wholly keep it from our doors. And so it is with war. Take our own case. As a Christian people it is our bounden duty, as a civilized nation it is in keeping with our professions, and as a trade-loving community it is our interest to avoid war. We honestly strive to act on this principle; but, notwithstanding all this, as a matter of fact, we have been at war somewhere or other nearly every year for the last fifty years!

So long as we live in an imperfect world with human nature as it is, so long as we have diversities of nations, of tongues, of religions, and of interests which bring men into conflict, so long shall we be liable to war. With this liability hanging over all the States of the world, it behooves their rulers to prepare for it. The nation determined to maintain its independence, to defend its honor, homes and rights, must be in the position of the strong man armed who keepeth his house.

May I venture to remind you of the many manly and noble virtues required by the soldier to fit him for his great share in this defense of the nation? He must learn to endure hunger, thirst, heat and cold; to undergo hardships and privations uncomplainingly, and to die when necessary for the safety or honor of his country. And the peaceful citizen of a great nation, he, too, has his duties in this matter of paramount importance. He, too, must make sacrifices if he would hand down to his children the priceless possession of national greatness and national independence. He must not, like the effete and cowardly citizens of Constantinople when besieged by the Turks, hoard or bury the treasure which, if liberally given to the state, would insure its safety.

The more men are fitted and willing either to endure these hardships or to make these sacrifices, the better citizens they are, and the more ready a nation is for war, the greater is its self-reliance, the more capable is it of guarding its independence, and the more worthy it is to be free.

The training involved in all this preparation for war is an invigorating antidote against that luxury and effeminacy which destroy nations, as well as individuals. This national training keeps healthy and robust the manhood of a state, and in saving it from degeneration nobly serves the cause of civilization.

May I advise you to study our little wars of the last half century, and to note for yourselves the effect they have had upon civilization? We are prone to remember them only for having increased our territory, and opened up new markets for our commerce. But is it not war that has widened the circle of civilization in all regions of the earth? Does not the advance of civilization in our own country prove this? Was not its introduction here the result of Roman victories? Then came the Saxons, the Danes, and lastly the Normans, all occupying our land as the prize of victory, and each and all helping us forward on the road towards civilization. Although each succeeding tide of invasion meant war and bloodshed and conquest, is it not true that an extended and improved civilization followed?

Is it not to internal warfare—rebellion, if you prefer to call it—that we very largely owe our liberties? Was it not by force the barons of England obtained our great charter? Have we not always been, if a proud nation, also a stiff-necked and stubborn people, tenacious of the rights enjoyed by our ancestors, and ready to resist aggression on the part of our kings?

Under strong provocation, we broke out into what we know as "The Great Rebellion," which brought about the illegal trial and execution of a king who did not know how to concede the political freedom which his people were determined to have. Did not the wars of this great rebellion insure an increased liberty in both church and state.

Few will deny that the gradual building-up of our wide-extending empire has been the result of war. Go where you may in any direction—north, south, east or west—and ask how it was we obtained the territory you land on, and you will find that it was by war. How was it we acquired Canada or the West Indies, and other provinces in the Western hemisphere? What about the Cape of Good Hope and our African colonies generally, and, still further off, those stupendous and thickly-populated Eastern kingdoms? Were they not, one and all, won for you at the point of the British soldier's bayonet? But in every instance, did not the war which added them to our empire extend the influence of Christianity and of the noble civilization which always follows upon our teaching of the Bible?

We do not force belief in Christ upon conquered people, but we do enforce the great principles of humanity and of civilized law which are the essence of our Saviour's teaching. We do not compel the Hindoo to believe in the Trinity, but we do say to him, You shall no longer murder female infants, nor will we permit your widows to sacrifice themselves upon their husband's funeral pyre, according to your long-established customs.

Wherever we hoist our flag, there we honestly strive—not always, I confess, with complete success—to establish those immutable principles of even-handed justice, and of an improved morality which are the best evidence of an improved civilization. As a nation, we can point with pride to territories once barbarous but now civilized, in every quarter of the globe where we have, or used to have garrisons. We honestly try to act as if we were rather the trustees of civilization than the occupiers of soil acquired through conquest. We do not selfishly lock up the provinces so acquired, and hold them exclusively for ourselves or for our trade.

In other words, ladies and gentlemen, the wars which extend our frontiers bring new territory under the influence of missionary work, of our laws, and of our civilization.

It is commonly and wisely said that trade and commerce follow our flag, but I contend we can assert with equal truth that Christianity and civilization, with all their attendant blessings, press forward very closely with both flag and commerce. Though not always wise in dealing with subject races, our unwisdom never takes the form of cruelty or cunning or religious bigotry, nor are we ever premeditatedly unfair or unjust. Our object is to confer upon them the blessings of civilization, and I maintain that we have not been unsuccessful in those efforts. But I would have you remember that the boons we thus confer have their origin in war.

Looking broadly at the question of how war has influenced civilization, I am bound to say that, on the whole, it has helped the cause of human progress. Man's best interests have often been furthered by it.

Where is now the sanguine man who, looking round upon the world as it is at this moment, can give us any assurance of a prolonged peace? Does not Europe bristle with bayonets? What are they meant for? Go abroad, and what is it the eye meets everywhere? Why, soldiers. But still more you can tell by the well set-up appearance of all the young men you meet that they, too, are trained soldiers who, though now in civil garb, would be in the ranks fully equipped within a few hours of war being declared. The whole male population under forty would be in arms, for all have gone through that soldier-making machine which takes in recruits at one end, and in the space of two years turns them out trained fighting men at the other.

In all the great European armies it is the whole manhood of the nation you now see in arms learning to be soldiers. This is a tremendous fact and is a curious commentary upon the fair-weather prophecies of the amiable men who assured the world half a century ago that the era of war was a thing of the past. We were then told that free trade and the civilization it was to inaugurate would render war impossible before the nineteenth century came to an end. Yet here we have at present, in the last few years of that century, every great capital of Europe crowded with men learning the art of killing, whilst in every town, almost in every village, the voice of the drill-sergeant is to be heard daily. And this is the result of our present-day civilization upon all the great States of Europe! It is most natural that the Englishman when studying this military system for the first time should exclaim how saddening it is to count up the many millions of civilized men whose whole attention for two of the most important years of their lives is now directed to thoughts of war and to making themselves efficient soldiers. We cannot blink at the fact, however strange it may seem to us, that civilization should give us such a result.

The system to which I have referred as being now in force in all the great Continental States is a system of universal military or naval service. Subject to a few exceptions, all young men of twenty are obliged by law to join the army or the navy for about two years; but I am only concerned

here with the army. That is a short period of service when compared with the seven or eight years the soldier who enlists in our army has to serve; but during those two years the foreign recruit is worked in a manner that would be impossible in an army composed like ours of voluntarily-enlisted men. If we attempted to imitate the German army in this respect, we should obtain very few recruits indeed. The fact, too, that these foreign armies only receive men of twenty as recruits whilst we are obliged to take boys of seventeen and eighteen for our army, because we can't get men, is another point of difference between us that is little understood here. For the two years the recruit remains with his regiment, he is well clothed, housed and fed, and he is taught the virtues required for the good citizen as well as for the gallant soldier. He learns to be truthful, honest in all his dealings, to be tidy and punctual, and to be obedient to superiors. He is taught to respect the law and is inspired with a love of regiment which is near akin to love of king and country. At the end of his two years' military education the recruit returns to his family and to his ordinary civil occupations in every way, morally and physically, a better man, a better subject, and a more useful and intelligent citizen than when he left his home.

I leave the philosopher to determine how such a system of universal military education will affect human thought in another two or three generations. But I would have you remember that this is the result of civilization re-acting upon war and not of war's influence upon civilization.

I have spent my life amongst soldiers, and I can tell you from experience that the training of the body and the education of the mind which they receive, so far from tending to unfit them to be good subjects or useful citizens, have precisely the opposite effect. In many ways it improves all men, and in a country like ours, where we have so few soldiers, it gives the young men of twenty-four or twenty five years of age, returning to civil occupations, many advantages over his civilian brother in the after race of life.

Some people may think that in saying this I am like the shoemaker who says there is nothing like leather, bound as a soldier to praise the soldier's education. But they cannot suppose that it is from a similar cause so many cadets corps have been started by civilians of late years. Few people know as much as Miss Octavia Hill of the needs and the condition of the waifs and strays of London and other cities. She so fully appreciates the value of a military training for these outcast lads, that she and other philanthropists have started boys' brigades for their education. They find that habits of discipline, order and punctuality, and the pride and pleasure in the comradeship and unity with which they can work together as members of a body, have a vitality and individuality of their own which constitute no mean order of education for them. It is, they think, the best cure for the disintegrating selfishness, the "heave-half-a-brick-at-his-head" sort of spirit in which it is their tendency to meet their neighbor. It is found that this sort of mental and bodily discipline soon teaches them how much more pleasure and strength there is in union than in disorder.

When upon this particular point I may add that most people will, I

think, agree with Mr. Darwin's saying that "selfish and contentious people will not cohere, and that without coherence nothing can be effected." He adds, "The advantages which disciplined soldiers have over undisciplined hordes follows chiefly from the confidence which each man has in his comrades." Mr. Darwin here describes to you, better than I could, one of the great advantages which all men of all classes reap from military discipline. Although he had not, may I venture to say so here, the good fortune to be a soldier himself, he saw so clearly into the soldier's life and training that he at once laid his finger upon the special point of a soldier's education that imparts strength and gives success to armies in the field. It is that same coherence which makes nations strong and respected.

The faculty of organization which a sound military system engenders is of the first importance in all commercial undertakings. The mutual confidence that exists between all ranks and all individuals in an army, and which the soldier comes to have in his officers and in his comrades under all circumstances, reacts upon the business of life in all its phases, public and private, commercial and political. The soldier learns by experience not only to trust and obey his officer, but that no success in war can be achieved unless he does so. It is, I think, the fact of this feeling being so largely carried into civil life by the thousands of soldiers who annually leave the army, that largely saves Germany from those strikes and quarrels between employers and employed which at times so often threaten the manufacturing prosperity of this country.

So little is known in Great Britain of the system of universal military and naval service that, if a soldier ventures to point out its good side, straightway, many people rush to the conclusion that he is a military fanatic who would like to force this system on the nation. The soldier, it would seem, is popularly believed to have but one fixed idea, namely, the creation of an enormous army quite regardless of what the country's military needs may be.

I must guard myself against any such construction being put upon what I say, for there is no such intention in my mind. Happily, owing to our insular position, we do not require a huge army like those we see on the Continent. Happily, too, we are saved from such a necessity by the voluntary military spirit which is in our people. As a proof of this I may mention that last year, and it was a fair average year, the numbers enlisted for the regular forces, the militia, the yeomanry and the volunteers amounted to over 120,000 men.

Now I stoutly maintain that civilization in the United Kingdom is *pro tanto* the gainer, for every one of those recruits when discharged will be a better man, a better citizen, than he was the day he first put on her Majesty's uniform. How many thousands of men are thus annually saved from falling into bad ways by joining the greatest of all our public schools—I mean the army—and by what they learn in that most excellent of all public training colleges. May I not, therefore, claim for our national army the position of being a great agency constantly at work amongst us in the interests of civilization. We certainly must have an army to defend these islands, to hold our great Eastern empire, and to garrison our coaling-

stations and fortresses abroad. But the army required for these purposes is small when compared with those on the Continent, which are supplied, and could only be supplied, by means of universal military service, a system that is not suited to the form of government under which we live. But although the army we require is comparatively small, it should be sufficient in number for the duties it has to fulfil both at home and abroad. In fixing its strength we should not forget what was reported by the commission which considered the defense of France soon after the fall of Paris and the end of the Franco-German War. The extract I would call your attention to is as follows: "The maintenance of an army is an annual premium of insurance against foreign invasion. You cannot diminish the premium without at the same time reducing the safeguards of the country. Forgetfulness of this fact cost us two provinces and £200,000,000."

The fact that we have no need here for a system of universal military service should not blind us to the merits of that system as it is applied abroad.

That system has always struck me as essentially democratic in principle, for it seems to reduce all men to the same level. Prince, peer, shopkeeper and peasant—all have to serve the State for the same allotted period in peace, and in the event of war to serve throughout it. There is something grand and noble and national about this practice which appeals to the imagination of men in all classes of a state.

For another thing, it is very evident to me that this military training of the manhood of Continental nations must have a great influence upon the physical development of the people, and consequently upon civilization in one of its most important phases. It fulfils a great educational function, and it is difficult to appreciate to its full extent the benefit which the people generally of any country must derive from the moral and physical training received by its young men when learning the soldier's trade. In fact, how much the years spent under military discipline improves those young men socially!

Whilst, then, I am no advocate for the introduction here of the Continental military system, I should very much like to see some compulsory system of universal physical training established by law for all the young men and women of the kingdom. We insist now upon a system of compulsory education for the mind. Why should it be more difficult or more despotic to insist upon a training of the body? The sound mind and sound body go together. Woe to the nation which restricts its free education to the improvement of the mind but leaves the bodies of its scholars to be as bent and crooked as the letters they learn, and with narrow and hollow chests which tell their own tale of physical weakness. In our Regular Army the physical training of every man is carefully attended to. A large number, some 25,000 men, pass from it annually into civil life. In a small way, therefore, the weapon you forge for war thus exercises a healthy influence upon the civilization of the nation at large.

My object has been to show you that this system of universal service is not all bad as some would have you believe, and that the nation which for many generations does submit to its burden is bound to become eventually

a finer race of men and women, of healthier and stronger mothers and fathers, than the people who are content to see their children grow up, under practically no control, in the squalor and unwholesome moral and physical atmosphere which so largely characterize the lodgings of the poor in our great cities.

Surely the physical training of a nation's young men is a matter of the first consequence? In my opinion the greatest blot upon our present school system is that we strive to cram the head of the crossing-sweeper's son with Latin and mathematics, and to teach his daughter the piano, but do little to develop the muscular strength of those young people. Every school-house should have a gymnasium of some sort attached to it, and surely a good gymnastic instructor is quite as important a teacher of our boys and girls as the schoolmaster and schoolmistress who honestly strive, and nobly strive, I may add, to fill the heads of their pupils with book knowledge? We think too much of their heads and too little of their health.

None can have a higher appreciation of the advantages of mental culture than I have. No modern nation can be great where book education is neglected. But all the book education in the world without strong limbs will fail to make a nation powerful. We have numberless examples in history of nations steeped in literature and learned in the schools of philosophy which were destroyed, almost exterminated, by hordes of barbarians who knew nothing of letters, and who thought the best thing to do with a library was to burn it.

It is because I believe that the nation which neglects the physical training of its boys and girls is bound to deteriorate that I hail with so much pleasure the establishment of boys' brigades throughout the country, and trust that their number will increase. The volunteer movement in 1859 rectified the faults of our rulers who had failed to provide effectually for the defense of this country, and in the same way I regard the creation of these boys' brigades as a sort of silent protest against the neglect hitherto shown to the physical training of the people.

If war be less frequent than in barbaric ages, or even in later centuries when nations fought with small standing armies, it is not because of any waning of military spirit amongst European nations. It is, I believe, because war between nations that have adopted the system of universal service has become too terrible to be lightly undertaken. Kings and other rulers hesitate to embark in a war which will no longer be a mere series of battles between standing armies, but a life and death struggle between the whole manhood of the contending nations, and consequently on a scale too big to admit of results being safely calculated. The very vastness of the armies now kept ready for war at the shortest notice seems to constitute one of our best guarantees for peace. It is in any case satisfactory to feel that, whilst there is no falling off in intellectual activity, the civilization of to-day with all its attendant wealth, has not as yet in any way weakened the manliness or lessened the courage of men. It does not prevent us from contemplating the possibility of war or from duly and manfully preparing to meet its horrors when necessary. It does not rob nations

of the patriotic spirit which has inspired men from earliest times to prefer war rather than suffer wrong or submit to national insult. In other words, this constant preparation for war saves the civilization of to-day from the corrupting effeminacy and luxury which directly led to the destruction of Greece, of Carthage, and of Rome.

We all want peace, none more than the millions of soldiers now in Europe, and we can best secure it by being at all times prepared for war. To be in that fortunate position of preparation there must be kept alive amongst all classes that manly respect for private and national honor upon which true military spirit lives and is nourished. There is nothing antagonistic between the pursuits of peace, between great individual as well as national prosperity, and the most perfect preparation for war. The condition of Europe at this moment is a proof of how naturally the spirit of trade, literature, science, and philosophy blends with the warlike instincts of a people. Civilization is as the bread of daily life; but the sturdy fighting spirit which now happily characterizes it is as the salt which makes all bread wholesome.

In dealing with the influence that war has exercised upon the progress of civilization in past ages, we have ample materials to guide us in forming an opinion. History tells us how it acted then upon the morality of man as well as upon his actions. War has not always favored human happiness or extended the area of civilization. It cannot be pretended that the great inroads of barbarians into settled countries increased the stock of human happiness. It cannot be pretended that the great Mohammedan conquests which swept over many Christian countries and converted some of the most favored portions of the earth into wastes, and some of the fairest and richest of cities into ruins, have helped civilization. But, on the other hand, it would seem as if every march forward made by man along the road of human progress has been ushered in by war and bloodshed. The advanced guard of progress has often been an army clearing a great highway through the jungle of barbarism for the civilizing influences that marched close behind under its immediate protection.

But what interests us most now is, how will this great and ceaseless preparation and training of whole nations for war affect the happiness and the future well-being of man in general? Can we argue from the results of wars that were waged under entirely different aspects; that were carried out by hired soldiers, whose thoughts and aspirations were simply professional and by no means in harmony with the feelings of the farmer, the mechanic, and the mercantile and other classes of civil life? The wars of past ages were accompanied by greater human suffering and by greater cruelty than those of the present day. They were carried out by a section apart from the rest of the community, by what I may call a military caste of drilled but uneducated men drawn from a low class of society, and whom these horrors did not consequently shock. Although those wars often lasted many years, they did not as a rule directly affect the moral character of the nations engaged as great wars do now. Nations did not then take the field themselves; they fought by deputy, being generally represented by armies of hired professional soldiers. But in future all wars and

warfare will be different. We shall have in the field not mere armies, but the whole virile manhood of the nations engaged. The shock will be sudden and tremendous and the effect so great, that no land war fought with regular armies can last long. One of the most hopeful aspects connected with wars yet to come is that they must be short.

We have the experience of three recent wars, waged by the most military of European nations, to draw lessons from, and I often ask myself, how have those wars influenced human progress and the general condition of European civilization? Have they in any way retarded its advance or lessened the benefits it confers on man? We all know as an historical fact that the earliest of these three wars insured the unity of Germany and transferred what I may term the presidency over all German States from Vienna to Berlin. In one respect, at least, it conferred a great benefit upon the conquered, for it broke up the dominion of priestly despotism and, in the best sense of the term, promoted civilization. It led almost immediately to the termination of the hereditary feud between Austria and Hungary, which had been the weakness of the empire in former times. It also settled old Austrian differences with Italy, and has been the means of establishing a close treaty union between those two states formerly so hostile. The second of these wars cemented and strengthened that unity so long the dream of the German poet and the heart-felt aspiration of every thinker in the Fatherland. The third war gave a blow to the Turk in Europe from which he can never recover, and won back from barbarism the promising young state of Bulgaria.

It is curious to note how quickly the military training given to all classes by this system of universal service solidified German unity, and made a nation out of what had been before a mere group of scattered provinces, each jealous of the other. This common training gave renewed strength and a vigorous impulse to German sentiment in all parts of Germany, and has had much to do with the formation of the great, the splendid German empire of to-day. But the most striking illustration of how this system of universal military training can bring together these several strands that make up the rope of national life, is to be found in Italy. Before that country had again become one nation from the Alps to Brindisi, there was no bond of union between her scattered provinces. There was little in common between the fighting-men of Piedmont and the unwarlike southerners. Without any doubt, the system of universal military service adopted by Italy has done much to make honest men of the Sicilian banditti, and to inspire the Neapolitan lazzaroni with some respect for truth and honesty. In fact, it has converted the many Italian principalities and states of fifty years ago, each with its peculiar idiosyncrasies, into the consolidated Italy of to-day, with its large army and powerful fleet. It is compulsory military service with the mental discipline it teaches that has to a large extent created, as it still fosters, the national sentiment of loyalty to king and constitution that had so little previous hold upon Italian imagination. It has been well said that "the nation and the army exercised a reciprocal influence on each other, of which the happy effects are now felt everywhere."

Able men have often urged that the creation of a military class would

endanger liberty and free institutions, and divert the energy and aspirations of a people from profitable objects and from all that tends to civilize man, to thoughts of war and to national aggrandizement by war; but this has not been its effect upon the great European States. On the contrary, it has in every instance associated itself with all the most vigorous impulses of national life, and has secured the world a lengthened peace. The military training which our soldiers—which all soldiers—now receive must inevitably have a great influence upon their future as citizens. Whilst it implants in them a patriotism unknown before, and impresses them with a sense of that national duty which makes men sacrifice everything for country's sake when necessary, it also enlarges the intellectual power they have to depend upon to obtain a livelihood in after life. In other words, individually it civilizes and enables them to enjoy life better, and nationally it makes them more useful members of the community than they were before.

I do not think the statesmen of to-day have sufficiently studied the effect that the drill-sergeant of Europe will have upon man, morally and physically in the next few generations; for, in order to make men into good soldiers now, we must develop their moral worth as well as train their bodies. My study of the question leads me to believe that, wherever all the physically strong of a nation are converted into trained soldiers under this new military system, the result will be decidedly in favor of an improved civilization.

When we had finally disposed of Napoleon, that mighty peace-destroyer, many persons thought the world had reached a new epoch in civilization. A new school of philosophy arose, and assured us that an entirely new condition of life was before mankind. We were told that, as civilization advanced, military spirit—the essence, the mainspring of armies and of a nation's fighting strength—would decline proportionately. This new school of thinkers told us that wars would cease, because the spirit and passions which led to wars would decline, and finally disappear under the mighty wave of advancing civilization. The world's history for the last half century is a cruel mockery of these prophecies, the dreams of a highly-cultivated, over-sensitive intellect rather than the prosaic deductions of common-sense.

These assurances so misled the British people that our navy was allowed to dwindle in size and fall off in fighting appliances, and our army to become absolutely inefficient. What was the result? When a Ministry, ignorant of war, allowed us to drift into a great conflict with Russia, though the bravery of our troops was as conspicuous as ever, the result showed the inadequacy, the inefficiency, of our military system.

A sincere lover of peace, I would warn you against those who would have you neglect the arts of war; who would prevent you from making those preparations for war which are, after all, the best and most effective guarantees of peace.

That the decay of military spirit, and, consequently, of the fighting power of a nation, leads to accumulated disaster, we have recently had a striking example in the complete overthrow of China by a comparatively

small and neighboring state. The Chinese are, above most races, apparently designed to be a great military, naval, and conquering people. They possess all the important attributes that enable men to be easily and quickly converted into excellent soldiers and sailors. Although it may be news to many, I assert them to be naturally plucky, and, as far as I have been able to judge of men under fire, quite indifferent to death. Physically, they are a very muscular people, trained from childhood to hard and incessant labor. By disposition and by necessity they are most industrious. They possess great powers of endurance both in heat and in cold. Uncomplaining in misery and want, they can live on little, and that little the poorest of food. I have no hesitation in saying that, given a free hand, and allowed at first to draw upon England for officers and military instructors, I would guarantee to raise in a couple of years a great Chinese army which it would be hard indeed to beat. There is certainly nothing in the East that could beat it.

And yet, what did we lately see in China during its war with Japan? Why, the whole military and naval forces of a vast empire fell to pieces in one year when attacked by a small state that possessed a well-trained army and fleet.

How and why was this? How came it that so vast an empire, inhabited by several hundred millions of a brave, hardy and manly race, should have been so easily and so rapidly overthrown by its small neighbor?

My answer is, it was because all military spirit was not only allowed to decay and die out in China, but that for centuries the Chinese laws and customs had been—it would almost seem designedly—calculated to kill it. All national military spirit, as we understand it was crushed under the opprobrium which was attached to the fighting man's trade. To be a soldier was to be the lowest and most despised of Chinese mortals. The greed for intellectual culture shared in by all classes had created this feeling of contempt for the fighting man. Where manual labor is despised because it is labor, and all activity is regarded as more or less degrading, there can be no true military spirit, and, consequently, no fighting army. A nation in such a condition must be near its fall, and, until those who rule China fully comprehend all this, her condition, internally as well as externally, must go from bad to worse.

In a country where most positions in the public service are obtained by competitive examination, no young man of any talent, of any ambition, or of any public value, entered the Chinese army. It was only the stupid, and those who had failed to obtain posts in the civil service, who became military officers. This had been going on for generations, for centuries before the war with Japan, and the consequence was that the army had come, by long neglect and contempt, to deserve the position assigned it in the estimation of the Chinese people.

I need not allude to the many other influences that were at work to make it what it was. The point I want to emphasize is, that all military spirit having been allowed to die out in the Chinese people, endowed though they are with many of the qualities most necessary for the real soldier, their army was consequently worth nothing in the day of battle. It was a mere undis-

ciplined rabble, devoid of all fighting skill, patriotism or manly virtues, and with no honorable gentlemen as officers to lead it. It was as useless for all purposes of war, as mobs have always been. Like the mob armies of all history, it was formidable only to its own peaceful countrymen and countrywomen, the peaceful villagers with whom it daily came in contact.

I have a great regard for Chinamen, and firmly believe in the future of China. But it is very evident to me that it can never aspire to a vigorous national life until it creates a healthy military spirit throughout the length and breadth of its flowery land. That military spirit will not only give it armies for defense against all comers, but will create and foster what is much wanted there—a healthy national sentiment amongst all classes. One follows upon the other as a matter of course. Upon this military basis alone can we ever hope to see a sound and thriving civilization arise in China. And if the outcome of the recent war with Japan is to be the creation of a really effective Chinese army and navy, it will be found that military strength will bring a high form of civilization with it.

But if it should be said that this general decay of patriotic spirit in China is the result of a corrupt philosophy of an unchristian religion, how can we meet the story of the Turkish capture of the Imperial Christian city of Constantinople? You remember Gibbons' splendid description of that terrible catastrophe, of the ignominious collapse of all noble feeling of self-sacrifice and of self-respect. Never was a nation more steeped in the forms and profession, and what I may style the superstitions, which usually cling round a complicated and ornate religious ceremonial, than were the people of the Eastern empire at that time. Yet, when the enemy were at their gates, to quote Gibbons' words, "the avarice of the rich denied the emperor, and reserved for the Turks the secret treasures which might have" enabled him to complete the defenses of the city, and to have saved both them and it.

I need not pursue further the sad story of cowardly disloyalty which brought down the awful judgment of God upon that ill-fated city. The people cried out for an angel to save them, but few fought manfully, or practiced any one Christian virtue in the cause of king or country. They fell, and who pitied them?

As I read history, I find that lying, cheating, sensuality in its worst forms, and all the unmanly habits and practices of an effeminate and over-civilized people, overtook nations as at Constantinople when their military spirit and fighting qualities declined. A sound, healthy, military spirit gives strength to a people. It is the guardian of the honor and interests of a nation, the safeguard of its freedom and liberties, the purifier of its civilization, its defense against enemies from without, and degeneracy from within.

When the warlike instincts of a people decline, when the drill-sergeant and the gymnastic instructor are replaced in a nation's estimation by the ballet-dancer and the singer, not only does national power decline, but all healthy civilization seems also to perish with it.

When Greece, and Rome, and Carthage, and the Arabs who penetrated into Spain, were in the zenith of their strength, letters, the arts and sciences, and all that makes healthy civilization enjoyable, also flourished. But as

their military instinct died out, its place was filled with that unwholesome and corrupting civilization which led to their downfall.

One of my purposes this evening in describing the Continental system of military service has been to point out that it not only enables the great States of Europe to be always ready for war, but that it is in itself a fine national school for the physical and moral training of the people. I have endeavored to show how this education is bound to have a highly beneficial effect upon them, and, consequently, upon the general civilization of Europe. That although we have no need here for such a military system, we should not, on that account, ignore its effects upon other nations. I have striven to press upon you the necessity of securing for our own people the advantages of a thorough physical training, and to point out how essential it is for our own safety as a nation to have our army, small though it may be, at any rate sufficiently large for all our requirements at home and abroad.

This is not the wisdom of to-day. We are taught it in the pages of history. One of the lessons we there learn is embodied in a few short words by the deepest thinker, the greatest philosopher of our country—Lord Bacon. Writing upon "the true greatness of kingdoms," he says: *Let it suffice that no estate expect to be great that is not awake upon any just occasion of arming.*

THE SUPPLY OF AMMUNITION IN WAR FOR ALL ARMS.

BY GENERAL MAKSHAYEFF, RUSSIAN ARTILLERY.

(A comparative study embracing Germany, Austria, France, and Russia.)

Translated from the Russian by FIRST-LIEUTENANT H. T. ALLEN, 2d U. S. Cavalry.

WITH the development of rapid-fire guns the expenditure of ammunition has materially increased and as the rapidity of fire is one of the successes in war, the effort to increase it is but natural. Now we are not satisfied with that quickness of firing which was attained by guns with breech-blocks, and with single loading rifles. At the present time the latter have been replaced by magazine systems, while special appliances have been adopted to increase the fire of field-guns and to diminish their recoil. In this manner during engagements in future wars a great increase of expenditure of ammunition must be expected, especially if we consider the enormous masses which will be concentrated on the fields of battle and the fierceness of future battles—the most important of which will probably not be finished in one day. The enormous expenditure of ammunition in future engagements will require a very energetic and carefully arranged transportation of the same from the rear. An insufficiency of it in the fighting lines at a critical moment may

have direful results. Therefore in order that the troops be in complete readiness to accept and maintain a stubborn engagement it is necessary that they have on their persons a full supply of ammunition, and that the replenishing of it be carried on uninterruptedly. The fighting supply consists of the supply carried and the supply transported. The carried supply consists of a certain number of cartridges in cartridge bags, cartridge boxes, etc., *i. e.*, directly on the person. For guns the carried supply consists of shells and projectiles in the gun limbers. The transported supply of fighting ammunition consists of cartridges and projectiles transported in the regimental train, *i. e.*, in cartridge carts or wagons and caissons of the respective troops. For an uninterrupted replenishing of the expenditure of these supplies it is necessary that a certain mobile supply follow the troops in parks, that at the base of operations there be continually a certain reserve of ammunition, and that the communications between these parks and the base be assured.

The object of this article is to acquaint the readers with the organization of the German, Austrian and French armies in this respect in time of war and to compare them with the Russian.

Means of providing the German, Austrian, and French armies with ammunition :

GERMANY.

I. Fighting Supply.—

1. Rifle Cartridges.	Infantry.	Cavalry.	
On the soldier.....	150	50	
Regimental train.....	50	10	{ (only regiments forming divisions)
Total.	200	60	

In the regimental train of infantry, cartridges are transported in 2-horse company wagons (*Compagnie-Patronenwagen*) one per company—all of which are in the train of the first order (*Kleine Baggage*). The cavalry regiments forming part of infantry divisions have no cartridge wagons in the regimental trains and therefore no cartridges are carried for them.

For cavalry regiments forming cavalry divisions ten cartridges per gun are carried in six cartridge wagons attached to one of the horse batteries of the division.*

2. Artillery rounds per gun.	Field Artillery.	Horse Artillery.
In limbers.....	30	30
In caissons	115	115
Total.....	145	145

Caissons are 9 to the battery and are divided into 2 echelons: 4 in the first, 5 in the second.†

II. Rear Reserve.—

To each corps belongs one park brigade (*Die Munitions Colonnen*).

*A cavalry division consists of six cavalry regiments, two horse batteries, and one pioneer command.

†In each caisson there are 77 projectiles, therefore in 9 caissons there are 693, which gives 115 rounds for each of the 6 guns.

A park brigade consists of two sections, each of which consists of 2 infantry and 3 artillery columns, in all 4 infantry and 6 artillery columns or parks. Each infantry column consists of 23 six-horse cartridge wagons; in all, the 4 infantry columns of the corps transport 80 cartridges per infantry gun and 60 cartridges per cavalry gun. Each artillery column consists of 23 six-horse caissons and 3 reserve carriages. In the six artillery columns are transported 126 rounds per each field-gun and 135 per each horse gun. Each infantry as well as each artillery column is subdivided into 2 half columns, each of 3 platoons.

For each army there is designated one army park (Field Munitions Park) consisting of a depot established at a central railway station and of ten mobile columns.

In the army parks are 20 cartridges per rifle, 19 projectiles per field gun and 24 per horse.

In case the troops are at a considerable distance from the central station, mobile columns are sent out from the army park and from intermediate depots. The army park is replenished from the principal depot of ammunitions (Haupt Munitionen Depot) established in frontier fortresses, the quantity of munitions of which is not designated. The principal depot is replenished from the principal artillery depots of peace time.

III. General Quantity of Ammunition.—

Place of Supplies.	For Infantry.	For Cavalry.		For Artillery.	
		Forming part of infantry divisions.	Forming cavalry divisions.	Field.	Horse.
On the men (artillery in the limber)... 150	50	50		30	30
In the regimental train (artillery in the caissons)..... 50			10	115	115
Total fighting supply... 260	50	60		145	145
In the mobile corps park..... 80	60	60		126	135
Total mobile supply... 280	110	120		271	280
In the army park (depot).... 20	20	20		19	24
In the principal artillery depots, limit not fixed.					

IV. Order of Supplying Fighting Lines with Ammunition.—

The exhaustion of ammunition deprives infantry of its principal strength in battle and renders artillery completely useless. For this reason the timely replenishing with ammunition constitutes an important duty of commanders of all grades. The expenditure of carried cartridges is made good from the company cartridge wagons which, in the beginning of the engagement, are placed as far as possible in covered localities not more than 800 metres from the line of fire; they are afterwards moved forward within the limits of safety. The carrying of cartridges from the wagons to the fighting line devolves upon battalion commanders who designate for this purpose men from the companies of the second line. Cartridges are given out from the wagons indiscriminately at every request for supplying the men who are engaged. Every reinforcement of the fighting line should carry with it a supply of cartridges for the men who are engaged.

Cartridges of the killed and wounded are collected. In battle the supply of cartridges carried on the person is not limited, but on the contrary the men carry as many as possible, in provision sacks and in their pockets. If a defensive battle is foreseen, especially if the position is prepared in advance, there must be a supply of cartridges collected in boxes or in other things. The emptied cartridge wagons of the regimental train are replaced on the field of battle by cartridge wagons of park columns, for which purpose the columns in anticipation of the battle have been advanced towards the field of battle; a certain number of the wagons advance to the field of battle itself, when their location as well as that of the whole column is communicated to the troops. After the engagement the supply of carried cartridges, likewise the supply in the company wagons should be at once replenished. If the corps moves in one general column, then the ammunition or park columns follow it in common columns of parks and transports in rear of the column of troops and the train. Every column of parks and transports (trains) is divided into two echelons; one section of the ammunition column (2 infantry and 3 artillery parks) is added to the 1st echelon and the other to the 2d and both move at the head of these echelons. Therefore the 1st section of the ammunition column is found approximately at 7 to 10 kilometres from the rear of the column of troops with their train; and the second, at 20 kilometres. As the column of troops of a corps with its train occupies about 30 kilometres, then the nearest section of the ammunition column may be considered, if an engagement takes place unexpectedly, at a distance of 40 kilometres, and the second at 50 kilometres, from the field of battle. Therefore in anticipation of the battle, part of the ammunition column is moved forward; if the corps marches in two columns the ammunition column is divided and follows the divisions. The order of replenishing the expenditure of artillery in battle is the following:

The 1st echelon of caissons on the march follows immediately behind its battery. The 2d echelons of all batteries of the advance guard and of the main command are formed together and follow immediately behind the command.

In going into battery ammunition for the first shots is taken from the limbers; then the limbers are moved back and take place with the first echelon of caissons as far as possible in a covered place, not more than 200 metres from the firing line. At this time 2 caissons per battery from the 1st echelon of caissons are sent forward to the guns and are placed 10 steps in rear; projectiles are taken from these caissons and carried to the guns. The 2d echelon of caissons is conducted towards the field of battle to not more than 600 metres in rear of the firing line, and it at once sends to the first echelon 2 caissons per battery. Empty caissons of the guns are replaced by full ones of the 1st echelon and empty ones of the 1st echelon by full ones of the 2d; the latter are replenished from the ammunition column which should be conducted to the field of battle at the proper time. The regulations call attention to an economical use of shells in battle. The rapidity of fire of six gun batteries under ordinary conditions is four shots per minute; in case of necessity the firing may be increased for a few minutes duration to 10 shots per minute.

AUSTRIA.

I. Fighting Supply.—

1. Rifle Cartridges.	Infantry.	Cavalry.
On the soldier	100*	50
Regimental train	42	..
Total	142	50

In the regimental train of infantry, cartridges are transported in company cartridge wagons, one per company.

In the regimental train of cavalry there are no cartridge wagons.

2. Artillery Ammunition.	Field.	Horse. †
In the limber	34	19
In caissons (Batterie Munitions- wagen.)	94	99

Caissons are drawn by six horses and are one per gun.

II. Rear Reserve.—

The rear reserve (Artillerie-Reserve-Anstalten) is divided into mobile and immobile.

The mobile reserve (Mobile Anstalten) consists of division, corps, and army parks, cavalry ammunition columns, and mountain division parks.

The immobile reserve (Stabile Anstalten) consists of army field depots and mountain field depots. To each infantry division ‡ also to each Landwehr division is attached one division park consisting of 3 columns—1 of infantry and 2 of artillery.

The object of the division park consists in providing all the troops of the division with ammunition, and in addition to this in replenishing the artillery with men, horses, and certain articles of material.

The infantry column of the division park consists of 30 four-horse cart-ridge wagons and carries 57 cartridges for each rifle.

The artillery column of the division park consists of 14 four-horse park caissons, 4 six-horse battery caissons and of one gun and two carriages with four horses each. The two artillery columns of the division park carry 110 projectiles for each gun of the division artillery.

The infantry column of the division park may in case of necessity be divided into 2 independent sections. The mountain division park carries 100 shells per gun, 30 cartridges per infantry rifle, and 15 cartridges per gun for cavalry and other troops.

Cavalry divisions are supplied with ammunition from the cavalry ammunition column, the purpose of which corresponds to that of division infantry parks.

A cavalry division is composed of 4 cavalry regiments, 2 rifle battalions,

* Before beginning battle this number is increased to 120.

† In all field artillery since 1891 there is the same calibre, namely 9 centimetres. Mountain artillery is 7 centimetres. Field artillery has 8 guns, horse artillery 6, and mountain artillery 4 per battery.

‡ Composition of one infantry division is four regiments (of 4 and 3 battalions each), 1 chasseur battalion, 1 regiment of division cavalry and 1 regiment of division artillery of 4 batteries of 8 guns each.

1 division of artillery (*Reitende Batterie Division*) of 2 batteries of 6 guns each, and a cavalry telegraph section.

A cavalry ammunition column, at the rate of one to each division, consists of 2 four-horse park cartridge wagons, 5 four-horse park caissons, 8 six-horse battery caissons, and 2 guns each with four horses; it carries 106 projectiles per gun, 9 cartridges per carbine and rifle, and 16 per revolver. To each corps is added one corps park consisting of one infantry and 2 artillery columns.

The corps park is intended to replenish the corps artillery with men, horses and ammunition; for providing the corps with material; the infantry columns of division parks with munitions, and the cavalry and technical troops of the corps with cartridges and explosive materials. The infantry columns consist of 32 four-horse park cartridge wagons and carry 18 cartridges per infantry and cavalry rifle, 13 for each rifle of the technical and train troops, 7 cartridges per revolver, and 6 cartridges per gun for the field artillery and the establishments in the rear. The two artillery columns of the rear park carry each 110 projectiles per gun for the corps artillery, and are of the same composition as the artillery columns of division parks. To each army is attached an army park intended to supply corps and division parks with ammunition and artillery material; to make repairs in the artillery material of the corps; and to take care of the guns and the material taken from the enemy.

The army park consists of as many reserve columns as there are corps in the army and of one reserve mobile arsenal (*Reserve-Zengs Kolonne*). Each reserve park column consists of the following four-horse wagons:

Forty-four cartridge wagons, 44 caissons, and 6 reserve carriages; all the wagons belong to the State, but the horses are requisitioned. Each column bears a number corresponding to its corps and carries 20 cartridges per infantry and cavalry rifle and 35 projectiles per foot and horse gun. The reserve mobile arsenal consists of 41 four-horse wagons with material and instruments; the wagons are governmental, the horses requisitioned. To the columns of all these parks, independent of the number of wagons cited additional requisitioned two-horse wagons may be added provided the conditions of the soil in the theatre of war demand it. This allows the normal freighting of the government wagons to be diminished by one-third which doubles the number of wagons of each column. For each army, and sometimes for several armies together, there is established in the rear an army artillery depot (*Army Munitions Feld Depot*) intended to supply all the rear mobile artillery establishments of the army with ammunition and artillery material.

The army artillery depot is established in rear beyond hostile attack, on suitable roads of communication, in localities where there are sufficient and convenient accommodations for depots and for the construction of workshops.

In the army cartridge depot is stored 25 cartridges for each infantry and cavalry rifle, 15 for each rifle of the technical and train troops, and also 130 shells for each field and horse gun.

III. General Quantity of Ammunition—Mobile and Immobile.—

	Infantry.	Cavalry.	Artillery.		Technical and train troops.
			Field.	Horse.	
On the soldier (in limbers for the artillery)	100	50	34	19	30
In regimental train (" " " ")	42	..	94	99	..
Total fighting supply.....	142	50	128	118	30
In the division park.....	57	9	110	106	..
In the corps park.....	18	18	..	..	13
In the army park.....	26	26	35	35	..
Total in mobile rear establishments.....	101	53	145	141	43
Total mobile.....	243	103	273	259	43
In the army store.....	25	25	130	120	15

IV. Order of Supplying Ammunition to the Fighting Line.—

The cartridge wagons of the regimental train and battery caissons replenish their expenditure from their corresponding columns of the division parks; but if there are nearer them other artillery war establishments, they replenish from them. Replenishing of the division and corps parks is made from the army park, but they may also be replenished directly from the army depot by special order of the field army administration. The army park is replenished from the army depot; the transportation is effected by railways, boats, or hired wagons. The replenishing of the army depot is effected by transportation from the interior artillery depots of the State. The general supervision of the supply of ammunition and other objects required by the artillery belongs to the chiefs of artillery of the armies. The transfer of supplies in the wagon of the rear devolves upon the artillery field officer belonging to the central rear administration.

FRANCE.

I. Fighting Supply.—

1. Cartridges.	Infantry.	Cavalry.
On the soldier.....	112	36
In the regimental train... ..	29	..
Total... ..	141	36

In the regimental train, cartridges are carried in battalion wagons drawn by four horses. The cavalry in the regimental train has no supply of cartridges, but for separate cavalry divisions having horse batteries at the rate of three per division, there are three four-horse cartridge wagons, which transport 36,280 cartridges. As the division consists of six regiments of four squadrons each, *i. e.*, $6 \times 4 \times 120 = 2880$ carbines, the supply of these three wagons gives about fourteen cartridges per carbine.

2. Artillery Ammunition.	Corps Artillery.		Horse Artillery of Cavalry Divisions.
	8-cent. horse guns.	9-cent. field guns.	
In limbers and caissons of batteries (six guns each).....	156	145	142

Caissons exist in the following numbers in batteries:

In field and horse batteries of corps, 9 caissons; in horse batteries of cavalry divisions, 8 (instead of the ninth caisson of these batteries there is a caisson of cartridges for the cavalry).

II. Rear Reserve.—

In every corps of two infantry divisions with artillery at the rate of six

batteries per division, and in corps artillery at the rate of eight batteries per division, there are two flying parks with small-arms ammunition and six flying parks with artillery ammunition. For each division there is one infantry park and two artillery parks. The composition of the flying infantry park is 32 four-horse cartridge wagons, of the flying artillery park 17 six-horse caissons. The flying parks carry in all 66 cartridges per infantry gun, 87 rounds per 8-centimetre horse guns, and 61 per 9-centimetre field-guns. For other kinds of guns there are no flying parks. In each corps there is one mobile or corps park, which consists of 69 six-horse and 12 four-horse caissons, also 45 four-horse cartridge wagons. It carries 47 cartridges for each infantry rifle, 62 rounds for each 8-centimetre horse and 52 for each 9 centimetre field-gun. In each army there is established an army park, which is intended to replenish the whole army with ammunition, fire-arms, and material for all the artillery and artillery establishments of the army.

The army park consists of two divisions: Ammunition and general reserve. The ammunition division consists of as many sections as there are corps in the army, and contains 110 cartridges per gun, 140 rounds for the 8-centimetre horse and 102 for the 9-centimetre field gun. The ammunition division is composed of five echelons, one of which has facilities for transporting half the ammunition, *i. e.*, one-tenth of the entire reserve of the army park.

The general reserve consists of various materials and work-shops and is not divided into echelons. The chief of the army park is at the same time chief of the artillery of the rear of the army. The first echelon of the ammunition division is located at a central railway station; the second echelon, loaded in wagons, stands on the road, between the central station and the base, forming a railway mobile store (*en cas mobile*); the third echelon is stored at the base; the fourth and fifth, in the beginning, are at interior depots, and are moved forward as necessity requires. In case the army is at a considerable distance from the central station, the first echelon may be moved forward and located at the central station.

III. General Quantity of Ammunition, Mobile and Immobile.—

	Infantry.	Cavalry.	Artillery.		Of Cav. Divisions.	
		Of Of Corps.	Of Se- parate Divi- sions.	Of Corps. 8-cent. Horse.	9-Cent. Field.	
On the soldier (in limbers for the artillery)	112	36	36	156	145	142
In the regimental train (in caissons for the artillery).....	29	..	14			
Total fighting supply	141	36	50	156	145	142
In division parks... ..	66	..	..	87	61	....
In corps parks	47	..	..	62	52	....
Total in mobile rear estab- lishment	113	..	..	149	113	....
Total of mobile reserve.....	254	36	50	305	258	142
In the army park (store).....	110	..	..	140	102	140

COMPARISON OF OTHER ORGANIZATIONS WITH THE RUSSIAN.

I. Rifle Cartridges.—

The greater the number of cartridges carried on the soldier the better is he prepared in case of battle. The quantity carried is, however, limited by weight and cannot pass a certain point without radically increasing the soldier's pack. With the diminution of the calibre the weight of the cartridge is diminished and a greater quantity may be carried. When infantry rifles had a calibre of .7 inch the cartridges carried did not exceed 40; with the change to .6 inch calibre, 60 were carried; with the change to .4 inch, 80 were carried; with the introduction of the .3 inch calibre 120-150 may be carried. At the present time European armies are armed with the .3 inch calibre (8 mm.) and the soldier carries in:

	Infantry.	Cavalry.
Germany.....	150	50
Austro-Hungary.....	100*	50
France.....	112	36

Armed with the Berdan .4 inch calibre, the Russian infantry carried 84, and the cavalry 36 cartridges per man. If the same weight of cartridges be carried for the new gun, .3 inch calibre, then infantry will carry 130 and cavalry 57 rounds. If the difference in weight between the 2 rifles (10.8-9.45) 1.35 lbs. be considered, then the infantry should carry 150 cartridges. Germany having a heavier cartridge than Russia has fixed upon 150 as the number for infantry.† This is more than in any other European army because its gun is lighter than any other.

	Calibre in millim.	Weight of cartridge in grains.	Number of cartridges carried by an infantryman.
Germany..... Magazine, 1888...	7.8	27.5	150
Austro-Hungary .Repeating, 1888...	8	29.7	100
France..... Repeating, 1886...	8	29	112
Russia Magazine, 1891...	7.6	25.81	150

The Russian gun has almost the same weight as the German while its cartridge is lighter; this allows the Russian soldier to carry at least as many as the German. The adoption by the principal European powers of the .3 (8 mm.) inch rifle is by no means final. Italy, Roumania and Holland have adopted the 6½ mm. and theoretically it is considered possible, to go as low as 3 mm. With the 6½ mm. gun it is proposed to carry 200 cartridges.

Besides the fixed number of cartridges carried on the soldier, a prescribed number is carried also in the regimental train, as follows:

	Infantry.	Cavalry.
Russia, .4 inch rifles.....	48	18
" .3 inch rifles.....	76	30
Germany, .3 inch rifles.....	50	10
Austro-Hungary, .3 inch rifles...	42	
France, .3 inch rifles.....	29	14

* Before beginning battle this number is brought to 120.

† This number has been increased somewhat.

In Russia these are carried in one-horse carts at the rate of 2 carts per company, in Germany and Austria in two-horse wagons at the rate of 1 per company, and in France in four-horse wagons at the rate of 1 per battalion. The Russian supply is the greatest and at the same time the most mobile, the French the smallest and the least mobile. The mobility of regimental cartridge wagons is of great importance for by it they are capable of following the troops going into battle away from roads. The Russian cavalry fighting supply with the adoption of .3 inch calibre will considerably exceed that of other armies, as seen by the following table :

	On the soldier.	In regimental train.	In horse battery train.	Total.
Russia, .4 inch rifles	36	18	..	54
" .3 " "	60	30	..	90
Germany, .3 " "	50	..	10	60
Austria, .3 " "	30	..	..	50
France, .3 " "	36	..	14	50

From this it is seen that only Russian cavalry regiments have cartridge wagons in their train. In the German and French horse battery trains a small supply of cartridges is carried for the cavalry to which they belong.

The fighting supply for infantry is as follows :

	On the soldier.	In regimental train.	Total.
Russia, .4 inch rifle	84	48	132
" .3 " "	150	76	226
Germany, .3 " "	150	50	200
Austria, .3 " "	100	42	142
France, .3 " "	112	29	141

II. Artillery Ammunition.—

The fighting supply for field artillery of the principal armies of Europe is seen by the following table :

	Field.			Horse.		
	Calibre in centim.	Number of caissons per gun.	Fighting supply per gun.	Calibre in centim.	Number of caissons per gun.	Fighting supply per gun.
Russia, battery gun 4.2 inch....	10.67	2	108	..	..	..
" light and horse gun 3.42 inch	8.69	1½	150	8.69	2	130
Germany.....	8.8	1½	148	8.8	1½	148
Austria.....	9	1	128	9	1	118
France.....	9	1½	145	8	1½	142

From the above the following may be seen :

A single calibre for field and horse artillery exists only in Austria and Germany. France has one calibre for field artillery but has preserved a special smaller calibre for horse artillery. Russian field artillery has two calibres, the smaller of which is also adapted for horse artillery.

A single calibre for all field artillery is very advantageous by simplifying the supply from the rear ; for in this case any ammunition caisson is capable of supplying any field battery whatsoever. The adoption of one calibre for

field and another for horse is bad; but it is worse when the field artillery has two calibres, because in the same park it is necessary to have shells of two sizes.

In consequence of the large calibre of the Russian battery gun it requires two caissons, which carry 108 rounds, while $1\frac{1}{2}$ caissons for the light gun carry 145-150 rounds. In the number of caissons for the light field-guns Austria alone makes an exception, having but one caisson per gun with a supply of 128 rounds. The number of caissons per horse gun in the Russian army is 2 to $1\frac{1}{2}$. Although the Russian horse gun has 2 caissons and its calibre is less than that of other guns, still its supply is only 130 charges, while that of the German is 148, and the French 142. This is explained by a desire to give to the horse artillery as great mobility as possible by diminishing the load.*

III. Park or Mobile Rear Reserve.—

The relative quantity of mobile or park ammunition of European armies is shown in the following table. In it are given data touching only .3 inch rifles and light field-guns because other data are too dissimilar for comparison.

	.3 Inch Infantry Rifle.				Light Field Gun.			
	Division.	Corps.	Army.	Total.	Division.	Corps.	Army.	Total.
Russia....	100	18	..	118	124	17	..	141
Germany..	..	80	..	80	..	126	..	126
Austria...	57	18	26	101	110	..	35	145
France....	60	47	..	113	61	52	..	113

From this it is seen that the quantity of cartridges of mobile parks for Russia and France is almost the same, 113-118; Austria has somewhat less, 101; Germany has still less, 80 per gun. The composition of the German park is relatively small. In Russia the 4 flying and 1 mobile park (per corps of 2 divisions) have 116 ammunition wagons of six horses each, while in Germany the 4 ammunition columns of the corps have in all 84 ammunition wagons of six horses each. The quantity of shells of the mobile park reserve of different armies varies from 113 to 145. The Russian army compared with the German has a greater park reserve of artillery ammunition, 141 to 126. The composition of Russian parks is relatively great compared with the German, namely: for 64 light corps guns of the former there are, in 4 flying parks, 96 caissons; and in one mobile park 16—a total of 112 six-horse caissons or nearly 2 per gun. In Germany for the 120 corps guns in the 6 ammunition artillery columns there are in all 120 caissons or 1 caisson per gun. As regards the park reserve of Russian battery (heavy) guns there are, for 32 battery corps guns 96 caissons in 4 flying parks, and 12 caissons in 1 mobile park or $3\frac{1}{2}$ caissons per gun. These caissons carry 161 rounds per gun.

The mobile park reserve is not everywhere distributed in a similar manner; in Russia and in France there are division and corps reserves; in Austria besides that there are army reserves, while in Germany there are only corps reserves.†

* A load per horse in Russia is 585 pounds, in Germany 774 pounds, in France 783 pounds, in Austria 792 pounds.

† The park supply of the artillery of a French corps (120 guns) is transported in 183 six-horse caissons (17×6=102 caissons of flying parks and 69÷12=81 of the mobile park) which allows $1\frac{1}{2}$

GENERAL RESERVE OF MOBILE SUPPLIES.

	Fighting Supply.	Park Reserve.	Total.
<i>.3 inch Infantry Rifle.—</i>			
Russia.....	226	118	344
Germany.....	200	80	280
Austria.....	142	101	243
France.....	141	113	254
<i>.3 inch Cavalry Rifle.—</i>			
Russia.....	90	18	108
Germany.....	60	60	120
Austria.....	50	53	103
France.....	50	..	50
<i>Light Field-Gun.—</i>			
Russia.....	150	141	291
Germany.....	148	126	274
Austria.....	128	145	273
France.....	145	113	258
<i>Horse Gun.—</i>			
Russia.....	130	17	147
Germany.....	148	135	283
Austria.....	118	141	259
France.....	142	...	142

IMMOBILE RESERVES AT BASES.

These are established at central and intermediate bases and are: in Russia, *field depots of ammunition* (1st line and intermediate) composed of local parks; in Germany *army parks* established at central railway stations and *central depots of ammunition* established in frontier fortresses; in Austria, *army artillery depots*; in France, *army parks* echeloned along the communicating railway as follows, 1-5 at the central railway station, 1-5 at the base, 1-5 between these two stations in cars forming a mobile railway store, and 2-5 in interior depots.

The general quantity of ammunition in principal depots and at intermediate bases for infantry rifle and light field-guns of these countries is shown below:

	Per Rifle.	Per Gun.
Russia.....	171	250
Germany, (1) at central station.....	20	19
(2) in principal depot.....	?	?
Austria.....	25	130
France, (1) at central station.....	22	20
(2) between the central station and the base.....	22	20
(3) at the base.....	22	20
(4) at interior depots.....	44	42

For maintaining communication between the immobile depots and the mobile park supplies the following measures are taken: in Russia all artillery establishments of the rear of the army are in charge of one person—caissons to the gun. The park supply of the artillery of an Austrian corps (96 guns) is carried in 108 caissons (18×2×3=108), and besides that in the army park 44 caissons per corps; therefore the entire park mobile reserve, 145 rounds per gun of the 96 guns of the corps, is carried in 152 caissons which give 1½ caissons per gun.

the chief of army artillery parks. Although the depots of ammunition have no permanent transporting facilities yet hired artillery transports may be formed. For this purpose the transport means of mobile parks and likewise military transports may be employed.

In Germany there is no special officer in charge of artillery establishments of the rear of the army; orders emanate from the inspector of artillery of the army. Army parks have a permanent transporting facility in the form of 10 mobile columns for each park.

In Austria the same may be said of the general supervision of the parks as in Germany. Army depots have no transporting means.

In France the general supervision of artillery establishments of the rear are in the hands of the chief of the army park of the army; he is the chief of the artillery of the rear of the army. The army park has transporting facilities.

GENERAL WAR RESERVE.

The manufacture of ammunition is so slow that to reckon upon the preparation of a considerable quantity during war is scarcely possible and therefore the supply required for war should be kept on hand in time of peace. The amount of the general reserve for war is unknown but the mobile supply of a single state is represented by a considerable number, *i. e.*, about 350 cartridges per small arm and about 300 shells per field-gun.

If to this are added the reserves of field depots these numbers will amount to 500, and with the reserve of interior depots they will be still greater.

If these figures be compared with the figures representing the ammunition expended by the Russians in the 1877-78 war then this reserve seems excessive. For the entire campaign, if all infantry divisions of the army be taken into account, the average expenditure per rifle was 47 cartridges; the greatest expenditure of cartridges for the entire campaign was in the 16th infantry division, 158 per rifle; the expenditure of cartridges in rifle brigades was great, an average for the entire campaign of 250 per man. The greatest quantity expended in one battle was in the 13th rifle battalion in the engagement of the 27th and 28th of December, near Sheynove—122 cartridges per rifle. The average expenditure of shells for the entire campaign was 157 per gun. The greatest expenditure for one action was in the 3d battery of the 31st Brigade the 3d of July at the storming of Nicopolis.

This data would indicate that in war a smaller quantity of ammunition would suffice than is maintained in the principal European armies. But no one knows when a war will end and therefore an army should continually have in readiness a full supply of its mobile reserve and of reserve in field depots, *i. e.*, it is necessary to have in complete readiness a much greater supply than will in reality be expended. As the expenditure of ammunition in future battles will be greater than examples of past engagements have shown, the reserve of war time must be considerably increased, especially if we consider that under the present conditions of mobilization and concentration of armies a very great development of military operations must be expected from the very beginning of the campaign, requiring a great expenditure at the outset.

"HORSE ARTILLERY AND CAVALRY."

BY MAJOR E. S. MAY, ROYAL HORSE ARTILLERY.

(From *Aldershot Military Society Papers*.)

HAVING in several recent lectures discussed the question as to how artillery may assist cavalry when acting with it independently, it has occurred to me that to-night I should rather dwell on how the two arms may best be turned to account to supplement or support the action of a combined force. It is in this latter rôle that we most often see guns and cavalry utilized at our field days and manœuvres, and on active service we may also anticipate a great extension of the demands which will in this way be made upon them. But in order to thoroughly appreciate the value of horse artillery, it is necessary in the first place to have a clear conception of its nature, and its origin, and therefore, perhaps, before I say any more, I may be allowed to cast a glance backwards to the earlier stages of its existence.

Originally adopted in 1759 by Frederick the Great for employment with his cavalry, the advantages with which mobility endowed field artillery soon caused the arm to be introduced in a far larger degree than its use with horsemen only demanded. Austria followed the lead of Prussia in 1779, France in 1791, when General Matthieu Dumas formed two companies, increased to nine in 1792, and thirty in 1793,* Russia and England in 1793, the latter with four troops, which had been increased to fourteen at the date of Waterloo. Galloper guns belonging to the Madras artillery had been employed in the second Mysore war of 1790-92, and again in the third Mysore war of 1799. In the year 1800 "an experimental brigade" of two guns was formed in Bengal, and what was termed a battery of horse artillery took part in the operations in Egypt with the Indian contingent (under Sir David Baird). From this time the value of the arm was much appreciated in India, and the number of batteries grew until in 1816 there were six troops permanently organized. Up to this time there were no field batteries, as we understand them, at all. "Guns lived in magazines," and were taken out as occasion required, and were manœuvred either by men on foot with drag ropes, or by bullocks. How vast was the difference in those early days between such batteries and the others of the horse artillery which possessed as much mobility as perhaps do any of to-day, is at once apparent, and accounts for the great preference shown for horse artillery by the generals who conducted our numerous campaigns in India in the early part of the century.

In Europe, during the wars of the French Republic, field batteries were but little more mobile, and we find Napoleon using horse artillery to a very

* The reputation of the horse artillery was extremely high in the French army at the period of its first introduction. General Foy, "*Histoire de la guerre de la Péninsule*," Paris, 1827, says: "The horse artillery at its creation was composed of the most active artillerymen, and was afterwards recruited from the best grenadiers. It performed marvels; in the campaigns in Germany simple captains in this arm acquired a reputation throughout the whole army. Generals soon wished to have no other artillery, because this being lighter and more efficacious, less of it was required, and the length of the columns on this was proportionately shortened."

large extent therefore, while in the Prussian service also its proportion to field artillery was very high. As technical improvements were brought about in the manufacture of matériel, and the weight behind the teams in field batteries was lessened, the difference between the two types grew smaller and smaller, until in 1870 it became a question whether there was any need to organize a special horse artillery at all. Any such ideas were, however, dispelled by the experiences of the campaign in France of that year, and a demand arose at its close for more rather than fewer such batteries. In 1874 the Austrians, who had discarded it, carried out a series of experiments at Totis, and in consequence of what they learnt, reintroduced the arm, and at the present moment, when we want to develop fire effect, and yet not increase the burdens of the horses, the mounting of gun detachments, or of part of them, is simply a matter of money. Everybody would wish to do so, but considerations as regards expense prevent its being done; because the value, or rather necessity, which mobility is to field artillery is the lesson which all practical work, whether it be on active service, or at Aldershot, or at Okehampton, seems to point out. For short distances or on level ground guns, with four or five men seated upon them and their limbers, appear to get along capitally; so they do, but weight tells surely when anything of a strain is felt. And it is also of great benefit to have men as gunners who are of powerful physique, such as those who wear the jacket in our service. The gunners in field batteries are in these days not of adequate stature, and those who speak of running guns into position by hand do not realize how arduous such an operation under existing conditions would be. It is not the least advantage which horse artillery possesses that it can rely on stronger men to man its guns than can our batteries of field artillery, and under the strain of active service this would soon be discovered. It is for these reasons that a practical soldier, like the late Prince Kraft, recorded his opinion that all the corps artillery should be composed of horse artillery batteries; and it is for the same reason that the cavalry divisions abroad now want to have batteries as an inseparable part of their unit. Otherwise, the experience of 1870 has told them that this adjunct will be continually in use away from them.

I happened last summer to receive a most excellent demonstration of the difference the equipment of a horse and field battery makes, and it comes in so appropriately here, that perhaps you will let me read you the letter which gave me an account of it. The writer of it (he belonged to the Honorable Artillery Company) said: "You may perhaps know that we have a battery of horse as well as a battery of field artillery, and that they are drilled together as a brigade division. We went out last Friday week to the Long Valley for drill, and drilled at a steady trot, forming line from column, column from line, and wheeling into battery columns, and into line, etc., etc. I had not been paying much attention to the horses themselves, when certainly within an hour of our arrival in the valley, the veterinary officer of the field battery came up and said that the division must be halted for a bit as the horses of the field battery were blowing. The batteries were at once halted, and there is no doubt that the field battery horses were considerably distressed, whereas those of the horse artillery were as fresh as paint.

All conditions were similar, *i. e.*, equipment (9-pr. R. M. L., without any ammunition); same stamp of horse, (all from T——, the same class he sends to the Fire Brigade); horses in similar condition; same skill in the drivers; the only thing different being the five gunners on the gun and limber in the field artillery, the horse artillery of course having none. In the service one is always in a brigade division, either all horse artillery or all field; therefore a direct comparison during similar movements would very rarely occur. There had been a little rain, and the Long Valley was heavy going, no doubt; but still I noticed on the road to Aldershot that the field battery did not seem to travel so well, though we did not march very fast; twelve miles in two hours being by far the fastest bit. My own idea had always been that of course horse artillery could keep going much longer than field artillery, but I had never imagined that the field artillery would have shown signals of distress as soon as it did. I have mentioned this to one or two officers of the regiment who have also expressed surprise."

I think that the last paragraph, just quoted, justifies my again accentuating a point on which men who have had much experience, I do not believe, have any doubt whatever.

I could quote similar examples from the records of active service, both of our own armies and of foreign ones, but I do not think I need further dwell on this particular point now, except perhaps to say that we do not very often want rushes over short spaces at a gallop from horse artillery; on an emergency we may need them, and probably will, but it is practice in getting over extremely long distances at a steady unbroken pace that is so valuable; the power to make quick forced marches which, Prince Kraft says, the Prussians learnt the necessity for, and practised after the campaign of 1866. And he also tells us from his personal experience that, "in order to come into action in time when moving from Rettendorf by Königinhof and Chotieborek, to a point south of Jericek, I had to trot 14 (English) miles in a hilly country; and even this as far as one can see will not always be enough in the future." Again he says (6th letter) that "forced marches were the rule in 1870," and quotes the experiences of the 1st horse artillery battery of the Guard, which marched on the 13th of August from Bermering by Oron to Dieulouard, a distance of 32 English miles. At Vionville the horse artillery brigade of the 3d corps marched seven miles in three-quarters of an hour over hilly and narrow stony roads. The field batteries took just double the time to do the same distance. At Beaune-la-Rolande again it marched 31 miles on to the field of battle.

But even on what may be termed the battle-field itself greater demands than formerly will be made on horse artillery. Distances will be greater than they used to be, and moreover there will in all probability be a marked difference in the manner in which a final effort to drive an attack home will be made. Formerly the reserve artillery possessed the heaviest metal, and it came up late in the fight, and was often concentrated against the point of assault, which was assailed directly from the front. A modern battle will partake more of the nature of an envelopment on a wide front, and unless accompanied by a flank attack, it will in the face of the retaining power of modern fire-arms scarcely be possible to turn an enemy out of his position

by a direct assault. It appears to me that any batteries which have been held in reserve will be sent on wide turning movements, and that the duty of carrying these out will fall naturally to the most mobile portion of an army.

There are, therefore, three rôles in which for the future horse artillery may be employed:

1. As an adjunct to the cavalry brigade or division in reconnaissance work, in pursuits, in retreats, or in an independent cavalry combat, fighting at decisive ranges.

2. As field artillery of a special mobility for use as corps artillery.

3. And, finally, when on occasions it may become the most important part of the cavalry brigade or division, when this is sent to make wide turning movements during the progress of a battle.

As regards the duties of guns during a purely cavalry combat, I do not want to refer to myself, but much has been said on that point in previous lectures; for that reason, and also because it is best, perhaps, not to dogmatize as to the tactics to be adopted in it, I will only briefly touch upon it now. It is the spirit rather than the letter of anything like rules which should guide men in actions where guns and horsemen act together as an independent force. We must try and work on a system, and the cavalry leader must have a clear scheme of action in his mind; but the best laid plot may suddenly have to be modified, and the broad principle is that the guns must aid the cavalry when and where they can. The *how* must sometimes be left to the circumstances of the moment, and after the first movements the gunner must often act on his own judgment, and not expect to receive further instructions.

One great thing to remember is that the enemy's squadrons are what we want to destroy, if we do that we can have his guns too, for they will hardly get away before our victorious pursuit. I know that I am here at variance with Prince Kraft, and his authority is to be respected. He says that the enemy's guns are first to be destroyed, and that when they have been accounted for it is time enough to turn attention to the cavalry. Such views are, however, in my opinion largely influenced by those which govern the action of artillery in an ordinary engagement, and are dictated by a mistaken valuation of the powers of guns in a short and fleeting combat. There would rarely or never be time, when the decisive crisis of the fight came, to engage more than one target, and then, at that supreme moment, even if you have half your guns temporarily out of action, perhaps through losses amongst the teams because you have made a bold advance, still, if the remainder can get a few shrapnel at a very decisive range into the enemy's squadrons, I am convinced the effect upon them will be so great that some sacrifice, should it be involved, will be justified.

On the other hand, if we are to judge by what has before now often been seen at manœuvres, should the two artilleries engage one another at comparatively long ranges, and be drawn into an artillery duel, the cavalry will fight their battle out quite independently of the guns, and there will be little or no coöperation between the two arms. And another great general principle should be kept in mind by artillery officers in this nature

of combat, and that is, that they must never, if they can help it, let their guns get into such a situation that the cavalry will have to make a sacrifice to extricate them. Few cavalry officers, in the heat and excitement of an action, and especially a rear-guard action, will send orders to the guns to move. They will have to conform to the progress of the fight, and the officer who leads them must not wait for orders after he has once unlimbered.

Nor do I need to remind you again to-night of what assistance guns may be to the cavalry working in advance of armies. I have previously dwelt a good deal on that point also, and a very few instances from the Franco-German War will in themselves be enough to convince even the most sceptical. The mere appearance of a horse artillery battery was enough on many an occasion to cause the hostile cavalry to withdraw. When Von Redern was reconnoitring with his brigade on August 15th towards Xonville, he came across Prince Murat's brigade belonging to Forton's cavalry division, the flankers of which skirmished for a little, but when a German horse battery was brought up, the brigade retired, and let the Germans come on, and see Forton's cavalry division halting near Mars-la-Tour. There were twelve guns with it too, which might have been turned to some account.

Again at Buzancy, the regiments of Brahaut's cavalry division refused to face the Saxon squadrons who were looking for the French army, because they had no guns to oppose the battery which was brought into action against them, and the consequence of that error on the part of the French led up directly to the surprise and defeat at Beaumont.

It is indeed in reconnaissance work ahead of the main army that horse artillery will, I believe, be quite indispensable. Nothing more effectually searches cover than a few shells, and they can force many an obstruction that might be held for a long time against cavalry alone.

I will not, however, to-night dwell long here; nor as regards the employment of horse artillery under the artillery commander as corps artillery pure and simple, is there, either, any necessity for me to enlarge. The guns are then turned to account when and where they may be most needed; and they are valuable because their mobility may at critical moments enable them to accomplish feats in getting into position in the shortest possible time beyond the powers of field batteries, or to do so over ground which might unduly tax the powers of less active units.

But on the third rôle there is much to be said which I think will be interesting, because the necessities of the day seem to here offer to cavalry and guns once more a sphere of usefulness in which they have before been largely turned to good account, and the great range and effect of modern shrapnel have confronted generals with difficulties which were not formerly experienced when forming a plan of attack.

If we consider what the course of a modern battle is likely to be, we can scarcely fail to be struck with the increased resisting power with which improvements in fire-arms have endowed the defense. Even in 1870 the character of a battle had grown to be of the nature of a long drawn out effort on the part of the attack to weary out and bear down by sheer weight

of numbers and persistence the stubbornness of the defence. Fire-arms, and especially those of the artillery, have improved vastly during the last twenty-five years, and to force the enemy's line by a frontal attack, seems, as I have said, on paper at any rate, an extremely arduous enterprise. Positions will, however, have to be carried, and will no doubt be carried, just as they have been before, even in spite of the most appalling losses; but every effort should be made to reduce the sacrifices involved to a minimum, and to let skill in manœuvring replace or supplement brute force.

Flank attacks have ever been employed when possible by every skilful leader, and in these days they will have to be resorted to when the ground is at all favorable. But the space occupied by troops now-a-days is so great that to move round an enemy's flank is no longer so feasible a manœuvre as it was. In doing so it is to be remembered that you also lend your flank to assault, and that unless the turning movement be carried out beyond striking distance of the foe, he may spring upon you in the act, just as Frederick did on the allies at Rossbach, or Wellington did on Thomière's division at Salamanca, or as Napoleon smote the Russians at Austerlitz. You must be able to strike very swiftly and opportunely if success is to reward you; the swoop on the flank should come simultaneously, if possible, with one from the front, and to effect such an union of force you must either surprise your foe completely, or you must forestall him by rapidity of movement.

Now, to keep out of reach of modern shrapnel means that your columns must move on a very wide arc. Not only that, but should circumstances suddenly alter, and it become expedient to abandon the enterprise, you should be able to draw your hand out of the fire ere it is destroyed. In other words, any general who in the future attempts either a serious flank attack, or such a powerful demonstration as shall influence his opponent's scheme, must be able to utilize troops possessed at one and the same time of great fire effect and immense mobility. Now, horse artillery batteries in conjunction with a powerful force of cavalry, supported too by mounted infantry, will supply him with the very tool he needs for his purpose.

And when such an employment of horse artillery is suggested I would remind you that it is only a revival of former tactics which is recommended. Napoleon habitually used cavalry and horse artillery in this very way. The campaign of 1814 will furnish several excellent illustrations.

At Rheims he turned the Russian left with 8000 horsemen supported by 30 horse-artillery guns. When Blücher, defeated at Vauchamps on the 14th February, 1814, was falling back by Etoges on Châlons, Napoleon endeavored to destroy him by a wide turning movement made with Grouchy's cuirassier division and its two horse artillery batteries. No one who reads the account can fail to see that the Prussians only escaped complete annihilation by the steadfastness of their infantry, and that they would have been unable to withstand the inundation of cavalry had guns been present to supplement the efforts of the horsemen; all the accounts admit this, and the Germans were frankly grateful for the good fortune which befriended them. The weather in the winter of 1814 was, however, very bad; the

fields, and even the roads, were deep in mud and snow, and almost impassable. The two horse artillery batteries that were intended to act with Grouchy got bogged, had to be left behind, and were unable to take their share in Napoleon's stroke. The infantry formed solid squares, which they could not have kept intact under the showers of case which the tactics of the time would have called forth upon them from the guns. Thus, though Grouchy brought nearly 100 squadrons to bear, Blucher managed to make good his retreat, and, although beaten, was able to reform his troops for another effort. Who will say that such a great flank attack by masses of cavalry on a retreating foe may not be perfectly feasible in the future, and bring the vast results with it that it has done before in military history? The fire of the guns will indeed be even more valuable than it used to be, for they can produce their effect from greater distances and over wider spaces than was formerly the case.

But an even better example may be culled from the annals of the year before, and the achievement of Murat at Dresden, on the 27th August, 1813. Napoleon was then also at bay before a vast preponderance of foes, and all his ingenuity was required to equalize the scales. That was a time of rain and mud too, and guns could scarcely be too light if they were to move with cavalry. Therefore the great Emperor double-horsed them with teams from the commissariat wagons, and he sent Murat with 10,000 sabres and six batteries of horse artillery to envelop and destroy the allied left. So well did that brilliant leader of horse perform his task that he killed and wounded 4000 men, and took 12,000 prisoners. I know the day was wet, and that the infantry could not use their muskets, but that was the fortune of war, and the performance was a great one all the same. The horse artillery batteries worked well with Murat's squadrons too, and we read how they followed up the beaten foe, and coming into action from hill to hill poured a destructive fire on their opponents, whose chiefs had not supported them, as they should have done, with guns.

There are lessons, I think, to be learnt from these old battles. The method by which the force was applied was different; ranges were short, and *mitraille* was used in place of shrapnel, but the principle which underlay the tactics is an universal one, and I do not believe that it is any extravagant notion to regard it as an influence which is still potent.

Indeed I shall presently show you the Germans in 1870 armed with modern weapons, and facing opponents equipped with a rifle but little inferior to our own of to-day, utilizing their cavalry and horse artillery for just the same purpose as Napoleon used his at Dresden, as Soult used his at Albuhera, and as ours was turned to account on the defensive at the same battle.

It is especially interesting to us to study defensive tactics, because they have been the methods we have so often relied upon, owing to the circumstances under which we have fought on the continent. Now, the soul of the defense resides in an opportune counter-attack, and it is on the flanks of the attack that such a blow may most effectively be dealt. It is because they were defensive battles fought against widely superior odds that I am particularly glad, therefore, to refer to two from the campaign of 1870, and

because also we may gather some most instructive and striking examples as to the use of cavalry and horse artillery on the field of battle from them.

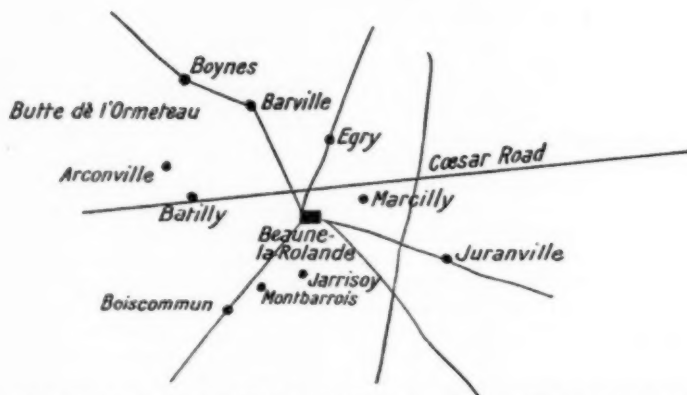
At Beaune-la-Rolande (28th November), according to the official account, 11,000 Germans with 70 guns were called upon to ward off the endeavor, inspired by Gambetta, of 60,000 Frenchmen and 138 guns to advance to the relief of Paris. Under the strain of such an unequal struggle we shall find artillery again and again called upon to make immense exertions, you will read of batteries asked to show great mobility, and we shall find guns when men and horses were wounded having to be abandoned because they were stuck fast in the soft ground. You may there see cases in which the superior mobility of horse artillery was of vast service, and you will glean instances of the guns and cavalry striking more than one opportune blow.

Early in the battle Beaune would have been captured by the French but that Major Körber led up the two horse artillery batteries of the 10th Corps from Marcilly in the nick of time to the east of Beaune, and taking the French infantry in flank at 800 yards, brought its advance to a standstill. On the left flank the French had also to suspend their advance, as they were suddenly threatened there by the 1st cavalry division. The latter had been assembled at Boynes shortly after the commencement of the action, and at 12 o'clock, in accordance with a summons from General Voigts-Rhetz, had advanced to the Butte de l'Ormeteau. The horse artillery battery, escorted by two squadrons of the 4th Lancers, which hastened forward in that direction, had, shortly after 1 o'clock, opened fire upon the enemy's columns which appeared between Batilly and Arconville, and afterwards from a position further south, upon the masses of troops marching along the Cæsar road. We need not pursue our story of the day further now, but no one who follows it out carefully in the official account will fail to note what a day of storm and stress it was, and how well all the special characteristics of infantry, cavalry, and artillery were in turn turned to account.

Beaune-la-Rolande, and the other battle I want to speak of to-day, are not so celebrated in this country as are some such as Vionville, and Gravelotte, and Woerth, which are in everybody's mouth and figure in every examination paper, but they are regarded by the Germans as struggles which may rank with even the great triumphs I have named, and they will repay study and attention on the part of officers. Loigny-Poupry is indeed quite one of the most dramatic and interesting battles of history, and valuable deductions in almost every sphere of tactics can be drawn from it. Just now, however, we will look into it more with a view to horse artillery and cavalry action than anything, and our notice must be but a brief one.

On the 2d December, General von der Tann with the 1st Bavarian corps was at La Maladerie facing south-west. On the previous day he had been assailed by the French in their effort to reach and relieve Paris, at about 3 o'clock in the afternoon, and his 1st, 2d, and 4th brigades had been heavily engaged, and had lost in the short fight of rather less than two hours which had ensued, 37 officers and 698 men killed and wounded, and 5 officers and 196 men missing. They had been unable to stem the onslaught in greatly superior numbers of their opponents, but had fought with great bravery

BATTLE OF BEAUNE-LA-ROLANDE,

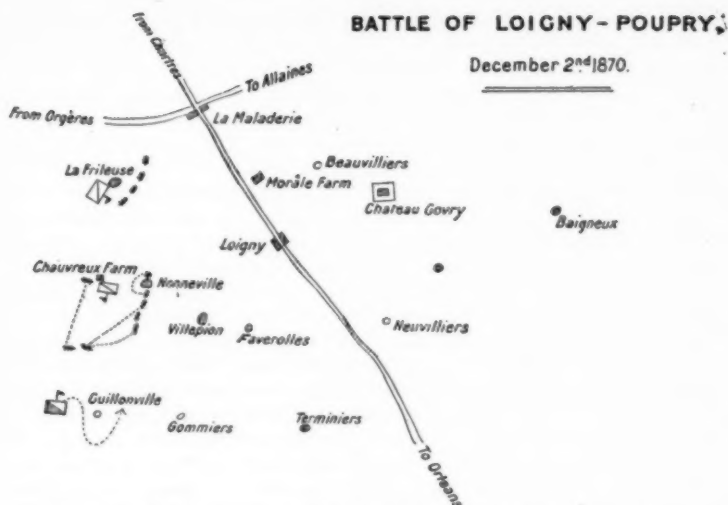
28th November, 1870.

and determination an uphill fight, which, however, is, as Villepion, to be recorded as an undoubted French success. The night of the 1st was intensely cold, and many of the German units suffered very severely from exposure, as they had been obliged to bivouac owing to the proximity of the enemy, while it did not add to their comfort that they had no cooked rations, in consequence of the wagons which carried them having gone astray. The French, too, were not only in superior numbers on the 2d, but they were in unusually good heart, having just won the battles of Coulmiers and Villepion. This circumstance should be taken into consideration in estimating the German performances which I am about to describe, and goes some way, at any rate, to decrease the advantage which their trained soldiers had over the raw levies which opposed them.

I may add that the country in which operations were taking place was generally level, broken by gentle undulations, but furnishing little cover of any sort; the fields were highly cultivated but were unfenced, and the sharp frost had rendered the soil hard and favorable to movement.

About 8 o'clock the German outposts could see that the French 16th Corps was again pushing on in full force, and Von der Tann received orders from the Grand Duke to take up a position between Beauvilliers and Chateau Goury, with his left resting on the latter place. He was informed that the 4th cavalry division would protect his right flank, while the 17th infantry division was moving on Lumeau and the 22d on Baigneaux to his assistance; but when in accordance with these instructions he was in the act of taking ground to his left, he was assailed before his movement was completed, and his 2d division had to be deployed and was in action at about 9:30 o'clock between Beauvilliers farm and Chateau Goury.

With reference to this particular part of the contest, it is enough to say



now that the fight surged to and fro for some time with varying success. The French at first pressed on very triumphantly, but a brilliant counter-attack by the 3d Bavarian brigade brought their advance to a standstill, and eventually forced them back in some disorder as far as Loigny. The whole French 16th Corps was now, however, deployed on the line Neuville-Nonneville, and as it came on the Bavarian brigade was forced to fall back with very heavy loss. The fight is chiefly remarkable for the part played in it by the German artillery; six batteries, in the first phases of it, formed a solid framework for the 2d Division to deploy on, and enabled it to rally against the powerful French assault. Later the batteries again stemmed the rush of the second French advance, and faced the hostile skirmishers while their comrades rallied behind the guns. Eventually the guns too had to fall back to a second position, but being reinforced there by two batteries from the reserve artillery, were enabled once more to make a stand and cover the infantry while it was being reformed.

The position of affairs was, however, a critical one for the Germans, and the French right was making a vigorous attack on the west side of Chateau Gouvy, while their centre seemed about to pierce the German position between it and Beauvilliers; but General von Tresckow, who commanded the 17th Division, now received word of the state of affairs at Chateau Gouvy, and he acted with a true instinct. He ordered Colonel von Kahlden of the 17th Dragoons to take his regiment and two horse artillery batteries* and to trot on ahead in order to lend what assistance he might to the Bavarians. Colonel von Kahlden sent one squadron to Lumeau and with the other three and the two batteries, at 10:30 o'clock, reached a point south of Chateau Gouvy, from which he was enabled to open fire unexpect-

* These batteries had only, however, 10 guns between them.

edly on the right flank of the French division (Barry). This artillery attack had the very best results. The Bavarians were extremely hardly pressed at the moment when the batteries were unlimbered, and the surprise and confusion created by the sudden storm of shells which they poured upon the French enabled the 3d Brigade to extricate itself and fall back.* Two squadrons were now sent away from the batteries to endeavor to establish communication with the 22d Division on the east of Lumeau, and one remained with them as escort. The French attacks on both flanks came to a standstill soon afterwards. I think the timely appearance of these squadrons and batteries furnishes us with a most interesting example, and well displays the value of a bold flank attack by cavalry and horse artillery. I must, however, now leave this portion of the battle-field in order to speak of events which will have an even greater interest for us this evening. Before quitting it, however, perhaps I may be allowed to mention an extraordinary proof of the efficacy of artillery fire, and an event, perhaps, unique in the annals of war which occurred when the eighth heavy battery of the 3d artillery regiment was assailed from both sides of Morâle farm by hostile infantry, and was able to repulse the attack solely by its own fire. When the battery subsequently moved forward it came on a vast heap of corpses, the evidence of its fire effect. Beneath one of them was found the color of the 41st French regiment, which the battery took possession of, and the trophy hangs to-day in the Royal Bavarian Army Museum at Munich as a memorial of its achievement.

But to return to something more relevant to our subject this evening.

The 4th cavalry division had been occupied since dawn in reconnoitring on the French left flank, and the Brigade Krosigk had been successfully engaged with the enemy, but had eventually fallen back before superior numbers.

The two horse artillery batteries belonging to the division had come into action at 10:30 against French artillery at Morâle farm, which they speedily caused to retire, and then advanced at a gallop to within 700 yards of French infantry, which they engaged. At 11:30 Prince Albert, who commanded the 4th cavalry division, received an order to take the Bavarian cuirassier brigade with his division, and to make a turning movement against the French left.

The two horse artillery batteries were now brought into action south of La Maladerie under the escort of one squadron, in a position where they were enabled to strike the flank of the French advance between Morâle Farm and Loigny. They were soon joined by two horse artillery batteries belonging to the Bavarian cuirassier brigade, who came into action to the west of La Maladerie, and from that position their fire, which was directed upon the swarms of French skirmishers along the road from La Maladerie to Loigny, and at Morâle Farm (1000 and 2000 metres distant respectively) was most effective, and assisted the Bavarian infantry very materially.

Meanwhile the 4th cavalry division had united itself together at La Fri-leuse, and remained there till about 2 o'clock.

About this time Prince Albert determined on a very bold and wide

* These two batteries fired 476 and 720 shells respectively during the battle.

turning movement, directed against the left flank and rear of the French, and moved the division at a trot towards Nonneville. When he reached the south of Nonneville he discovered the columns of march of the 17th French corps moving on Terminiers from the south to support the 16th. Prince Albert wheeled two brigades to face these columns, while the 3d Brigade (Krosigk's) preserved the former direction and moved on Guillonville. But the French batteries of the 17th Corps now came into action and fired on the division, and its advanced parties were fired upon also by French infantry near Gommiers.

To attack infantry which had not been at all engaged as yet would have been a useless expenditure of life, and Prince Albert recognizing that the moment was not opportune for attack drew his division back to Chauvreux Farm. Meanwhile one of his horse artillery batteries* came into action on the north-west of Nonneville, and engaged a French battery which had moved into position close to a windmill to the north of Villepion. Two Bavarian horse artillery batteries also hurried up across country at a rapid trot from where they had been in action near La Maladerie, came into action on the other side of Nonneville, and supported it. Their combined fire soon drove off the French guns, and then the battery on the north of Nonneville joined the two on the south, and turned their fire on to some French batteries near Faverolles. These they drove away, and thus began to shell the village of Faverolles and the French infantry posted near it. A squadron of uhlans was left with these three batteries as an escort. The other horse artillery battery† belonging to the 4th cavalry division had meanwhile accompanied Prince Albert to Chauvreux Farm, and remained there with the division.

Towards 3 o'clock several French cavalry regiments showed themselves on the west of Guillonville. The horse artillery battery from Chauvreux Farm at once galloped out to meet the new danger, and came into action "at a decisive range" against them. Its fellow battery, having observed the French advance, also moved rapidly to its support, and engaged the hostile squadrons at a range of 1200 metres. These quickly had enough of the contest, however, and beat a retreat.

Just now, too, another attempt was made by the French cavalry to advance from the other side of Guillonville, but they were received by such a storm of shells from the two batteries that they fled precipitately, *davon-jagten* is the German word. Indeed, we read that so headlong was their flight that the ten German cuirassier squadrons which had moved up to charge them could never catch them up. Finally the French squadrons rallied behind their infantry at Gommiers, and the German pursuing horsemen had to let their prey escape.

The uhlan brigade of the division had meanwhile struck upon some French infantry, which had been thrown into great confusion by the artillery fire, and captured 200 prisoners. Several other encounters between smaller bodies of the brigade also took place, but in every instance the French cavalry refused to face their opponents, and it was only the in-

* The 1st horse artillery battery of the 5th artillery regiment.

† 2d of the 11th artillery regiment.

fantry fire from buildings and villages which held the German inroad back.

One word more may be added as to the horse artillery.

The two batteries, which had so gallantly driven off the French cavalry, soon afterwards went further forward, and engaged some French batteries which had come up on the south of Faverolles. They were joined by one of the two Bavarian horse artillery batteries, and the other was left alone in its original position.

We have now to record a German failure, and we have a lesson as to the error of breaking up a brigade division. A French battery was facing this one, but as it seemed to be at too great a range it was not considered dangerous. When the Bavarian horse battery was left alone, however, the despised French battery, as though to vindicate the power of artillery, opened so rapid and accurate a fire that, in spite of the great range, it completely surprised its opponent and compelled it to limber up and retire.

Now I think that amongst these incidents thus briefly related we have very striking examples of what horse artillery and cavalry may accomplish during the course of a great battle. Prince Albert showed the greatest judgment and skill in the way in which he threw the weight of his command into the scale, and the onslaught he made on the French flank and rear had the most pronounced effect.

The German horse artillery batteries* have also received the highest praise for their conduct on this day, and their intervention materially affected the course of the battle. For, under the menace of their shells the tide of the French advance was brought to a standstill, while the immediate evidence of their prowess lies in the fact that the 3d Division of the French 17th Corps was deployed to meet their flank attack, and was left behind to guard the left flank while the loudest cries were going up towards Loigny for its aid. We are concerned only now with horse artillery and cavalry, or I could tell you much more of this most interesting and instructive of fights, but I hope I have said enough to show you how potent and valuable a factor in a modern battle the mobility of cavalry and horse artillery may prove to be.

In this battle 28,000 German rifles, 6200 sabres, and 196 guns opposed 87,300 French rifles, 5600 sabres, and 264 guns, and captured 2500 unwounded prisoners, 8 guns, a mitrailleuse, and a color.

On the German side, the proportion of guns to other troops was 5.73 per 1000 men; while the defeated had only 2.84 guns to the same number.

Examples to illustrate almost every feature of warfare can be culled from this battle, but there is no time now to deal with all of them. One, however, my friends of the cavalry will like to hear of, and perhaps you will spare me a moment to mention it.

When the French infantry were being driven back at about half-past twelve, by the advance of the German 22d Division, a 12-pdr. battery of the reserve artillery of the 16th Corps tried to come into action near Neuville to cover their retreat. Captain von Marschalk, who had ridden on about

* The two horse artillery batteries belonging to the 4th cavalry division fired 900 shells between them during the battle.

500 paces in front of his squadron (the 2d of the 11th Uhlans), observed its movement, but thought at first it was a column of wagons. He, however, signalled to his squadron to come to him, and placed it in concealment. When the French carriages came nearer, and it was seen that they were certainly guns, the squadron rushed out suddenly upon their flank just as they were coming into action. So quickly and skilfully was the surprise effected that not one single round was fired by the battery, and the whole of it was captured. That is to say one officer, 76 men, 77 horses, 6 guns, and 8 wagons fell into the hands of the Germans without a shot being expended in self-defense. It is an achievement fit to rank with Tobitschau, and should, like that brilliant example, encourage cavalry officers to endeavor, by means of turning cover, and taking the lie of the ground to account, to surprise artillery, and accomplish great results with little or perhaps no loss.

To-night, however, I have no time left to discuss interesting phases of cavalry and horse artillery tactics, suggested by such an incident, and I must pass on to make a few deductions from the examples which I have quoted this evening.

I hope I have made good my contention, and that I have shown how the teaching of military history will bear me out, when I suggest that our cavalry and horse artillery should, on the battle-fields of the future, devote their attention to the enemy's flanks, to make powerful demonstrations, or even auxiliary attacks, when we are the assailants, and to be in readiness to fall on the hostile line of retreat should we win our way forward. When, on the other hand, we await the enemy's assault, the same arms should secure us from similar enterprises on his part, threaten the flanks of his advance, or even deal a swift and opportune stroke, such as may pave the way to an important counter-attack.

It may be asked whether a cavalry division with two or three horse artillery batteries would be a sufficiently powerful force to produce much impression on the enemy in the manner suggested. My answer here is that what has happened before will happen again, and that as the modern horse artillery gun is so powerful that it can produce a very pronounced effect at 2500 yards at any rate, the chances in future will be more in our favor than they were in the past.

For, at such a distance as I have indicated, it will not be easy for an enemy to estimate the exact strength of the turning force, and, as I would suggest that the cavalry fight when necessary on foot, it will not be easy for him either to correctly analyze the exact composition of the force. I believe the effect of such a counter-attack as I have in mind would be very great indeed, and we must remember that a British cavalry division will have a battalion of mounted infantrymen with it also. These, it seems to me, would form a very valuable escort to both cavalry and guns, and would insure their safety from any efforts against them made by hostile riflemen. I believe, in fact, that there are great possibilities and opportunities here for mounted infantry, and that through their aid a very mobile force, composed of the three arms, may in the future accomplish a very great deal by working together in the manner I have foreshadowed.

An interesting question may be raised as to whether it is not desirable,

therefore, that horse artillery should form an inseparable portion of the cavalry division, and should not be taken away and absorbed in the general fight during a pitched battle. I believe both cavalry and horse artillery officers would welcome such an arrangement, and in Germany, I understand, it is now decided that it shall be so. But in Germany they have a very powerful artillery, and can perhaps afford to leave some batteries idle for a time at any rate. In England, on the other hand, we are very weak in artillery, and even our newest organization only gives an army corps 102 guns with which to fight 120 which a German or French corps has with it. In the face of such a disparity I cannot help thinking that the batteries will be called from the cavalry division, and placed in line to counterbalance the foreign preponderance. As a mere question of tactics it would, I believe, be usually best to leave the guns to the cavalry entirely, but circumstances, as I have said, may be too strong for a British general, and he may have to call up guns from wherever he can get them. And, therefore until the Government supplies us with more field artillery, I doubt whether a state of things which we would all desire can be brought about.

None the less we must hope that the horse artillery will sometimes, at any rate, be forced to work with the cavalry division in the manner I have suggested, and will accomplish perhaps more in that way than if placed alongside the remaining batteries of the army corps.

And this brings me to another point. I have said before, and say again now, that when guns and cavalry are working together independently, the cavalry is the principal arm, and the batteries are a mere auxiliary to it. That is quite the truth, I believe; but in this particular rôle which I have been discussing, it will be noticed that I have somewhat reversed the relative importance of the two arms, and have suggested that in these enveloping movements the principal effect is to be sought from the fire of artillery, while the principal duty of the cavalry will be to guard its safety. The enemy's squadrons may offer a tempting objective very possibly, but his infantry at the stage of the battle which I have in mind will be still unshaken, and it will be better to bring them to a standstill by means of shrapnel fire than to sacrifice a valuable arm, unless there is some crying necessity for doing so.

I wish, however, to guard myself carefully against being misunderstood. I do not suggest that squadrons are to refrain from utilizing their powers in their true rôle, that of shock, should an opening come to them. If it can succeed in gaining the exposed flank of an infantry attack and surprising it, a charge well executed by a cavalry division might have the most far-reaching consequences; but we cannot count on surprises, and should none be feasible, then we must fall back on the effect of fire, and bring the foe to a standstill by shells and bullets. To enable guns to settle down to a deliberate cannonade it will be necessary to secure their flanks and rear, and the duty of safeguarding them will become a paramount one, and must be left to their brethren of the cavalry and mounted infantry. But there is surely as honorable a field here for coöperation between us all as there is in the more exciting and rapidly moving incidents of a purely cavalry action? On one occasion the guns should play into the hands of the squad-

rons, in the other, the anxiety of the squadrons should be for the guns. In the one case we seek to produce our effect chiefly by shock, in the other chiefly by fire. But in each and every case we work together to help one another, and with but one end in view—the most complete and rapid destruction of our opponent. And that the way to such success is paved by a genial coöperation is the lesson I would wish to inculcate. It is only by the most complete coöperation that we can hope to fully accomplish even a small part of the duties that fall to cavalry and guns, but, given a clear, mutual understanding between us, there lies an almost immeasurable field of usefulness before our arms. If this evening I have succeeded in at all adding to the chances of such an understanding, and such coöperation, I shall feel completely satisfied.

DISCUSSION.

Major-General E. A. WOOD, C.B. :—I feel myself in rather an invidious position here to-night as being the only cavalry officer present holding the rank of general. I have very little to say to the admirable lecture to which we have just listened. It has certainly opened out a great many points which may lead to a searching discussion of much importance. There is one thing I could not help noticing, and that is where our lecturer led us to believe that in reconnaissance the artillery are more or less in a defensive position, and on that point I cannot help agreeing with him altogether. The artillery must be the pivot on which the cavalry moves, and I should like him to tell us in what way. The lecturer spoke about squadrons being the target for guns instead of the hostile artillery, but much of this must be guided by chance. I fancy that in reconnaissance the artillery on either side will not commence the combat. Their object will be to conceal themselves; but when they do open fire, on what portion of the cavalry will it be? It can hardly be the first line. Would they have time to take the range? The advance is very rapid, and they would hardly have long enough time to get in an effective fire. It will be more likely to be on the hostile supports and reserves as they emerge from close formations; and in the event of the attacking cavalry being successful, they will then have but a small rôle to play, as they cannot change their position in time to coöperate in the movement. On the other hand, should we be driven back by hostile fire, then the artillery will have to sacrifice themselves to let the cavalry get away. Therefore, in reconnaissance the artillery will be more or less on the defensive. As regards turning movements the lecturer says we might be too weak to accomplish very much, and our cavalry, I am afraid, is proportionately weak. Could we afford to detach them for large turning movements? I think it is doubtful. At any time, however, a great opportunity might be seized by a dashing cavalry leader, and once the cavalry commit themselves to such a movement, the artillery will act entirely on their own account. I am afraid I have made a very lame comment on the lecture. But I should like to ask the lecturer on what portion generally of the hostile cavalry should the fire of the guns be directed? I cannot think it will be on the first line; I think it ought to be chiefly on the supports and reserves.

Lieutenant-Colonel E. O. HAY, R.A. :—In reference to the question raised by General Wood may I venture the suggestion that a man who only plays some pieces on the chessboard himself and leaves some one else to make the moves of some difficult piece for him, will not probably succeed in winning his game. Thus, in the fight of the independent cavalry, the direction of the horse artillery must be undertaken by the cavalry leader himself. His previous reconnaissance of the situation and the ground resulting in the handling of the horse artillery as well as in the accurate timing of the blow he strikes

with his cavalry. He will thus allow time for the horse artillery (launching forward at speed) to take up the position which he has forecast for them, and which dominates the enemy's cavalry during the charge. The horse artillery will then be in time to fire on the first line of the enemy's cavalry—the one thing it exists for. "Ranging" will not be difficult; for the range will surely be extremely short, the target extremely large, and the fire an enfilading one. All depends on the cavalry movement and final charge being timed by the same mind as has launched the horse artillery into position.

The LECTURER :—As regards General Wood's question as to what we gunners would fire at under the conditions mentioned, I really think that is a matter which must be left to the circumstances of the moment. If I must answer it, however, I will say that we should fire at what presents the best target. But I think that artillery would in ordinary cases certainly have time to fire at the first line, and, if it had time, it should do so. When the first line did not offer a target, as might happen if it were masked by our own cavalry in their attack, or if there were no time to engage it, then the guns would devote their attention to the second and third lines. But it would be very injudicious to lay down a hard and fast rule, and to say to an artillery officer that he should always fire at this or that particular line. A fold in the ground might make all the difference, owing to it the second line perhaps not being much exposed, and the third under cover altogether. I think it must be apparent that it will be best to let an officer on the spot decide such a question. As regards the rapidity of artillery fire in the cavalry combat, what I should like to say is that under the system which we now adopt, in which we utilize "magazine fire," we can arrive at great rapidity, and such fire is very effective up to 1000 yards. It takes the place of the old *mitraille* with smoothbores, the horse artillery projectile of the past; the guns are laid as for "case" with fingers, and are not run up between the rounds, so that we can get a good many more in than we can when firing shrapnel. I think this nature of fire would be very useful in purely cavalry battles, and personally I hope guns in such combats will not hesitate to go in within 1000 yards of their objective should it be necessary to do so. At such ranges and utilizing "magazine fire" I believe they will be able to fire sufficiently rapidly to produce a great impression, even on squadrons moving fast, and will be able to give the closest support to their own cavalry. Colonel Hay has partly answered another question raised by General Wood. I do not think that guns should act entirely on their own account in a turning, or any other, movement. If what I said has given rise to any such impression, I have not expressed myself clearly. What I intended to urge was that, when left without orders, the artillery leader must not be afraid to act as he judges best, and in turning movements I suggested that the artillery might frequently be called upon to play the principal rôle. The coöperation of guns with cavalry is a matter which largely depends on a complete understanding of and between the two arms, and on a good forecast on the part of the cavalry leader. But once he has made the first forecast it will be very difficult for him to alter any arrangements, and then the artillery officer must very often act on his own responsibility. There does not seem any other point left for me to touch upon, but I may perhaps add that practical experience together is the only way to insure that intimate knowledge of one another which is so essential to success.

General H.R.H. the DUKE OF CONNAUGHT :—It only rests with me to thank Major May for his very able and interesting lecture. He has given us instances in which cavalry and horse artillery have been of the greatest use. He has shown us, and quite rightly, that the duties of combined cavalry and horse artillery are now, and will be in the future, as potent as they have been in the past. One thing I am sure must have struck us when listening to his interesting lecture, and that is how important is the harmony that should exist between the officer commanding the cavalry force and the officer commanding the

horse artillery attached to him. The answer to the last question shows that a great deal must be left to the artillery commander's own sense, and especially the quickness with which the movement has to be effected. It must depend upon him to follow up the operations of the cavalry and carry out their object. This may be done in one way or another, according to the circumstances of the case. I feel confident, and every officer here present will feel the same, as to its being essential for the successful working out of any movement, be it reconnaissance, direct attack, or flanking movements, that there should be complete harmony between the cavalry and horse artillery, and that each should recognize the importance one is to the other.

COMPETITIVE PRACTICE IN THE GARRISON ARTILLERY AND ITS EFFECT ON THE TRAINING OF OFFICERS AND MEN.

BY MAJOR P. SALTMARSH, ROYAL ARTILLERY.

(Proceedings of the Royal Artillery Institution.)

PREVIOUS to 1891 shooting competitions in all branches of the artillery were, as we know, confined to individuals. A written examination was held and the six N. C. O.s and men who obtained the greatest number of marks fired so many rounds apiece at a standing target, the results were added to those obtained in the paper work and money awards allotted accordingly.

Except among the competitors themselves these proceedings evoked no great interest, and this kind of prize shooting had but little effect on the training of the battery generally.

The introduction of the present system of competitive practice in 1891 was certainly a happy thought, and the regiment is much indebted to the officer to whom it occurred in the first instance.

Since its introduction in 1891 two important amendments have been made to the rules for carrying it out in the garrison artillery.

In 1893 it was ordered that half the gun-layers employed at the practice should be selected at random by the chief umpire from all the paid gun-layers of the company, which the battery had now become.

In 1895 it was further ruled that as many gun detachments as possible were to be formed, out of which the chief umpire was to select four at random.

In addition to the above changes, I may mention that, whereas in 1891 and 1892 the competitive practice was almost invariably carried out when possible at a Hong Kong target; * the number of hits on a battle-ship being estimated, since then a record target has generally been used, and this year, of course, the regulations have enforced the use of the latter among companies competing for the D.-A.-G.'s cup.

I propose now to discuss, first, the effect of the system generally on the

* See JOURNAL No. 67, January, 1894.

training of the personnel of the garrison artillery and then deal with the alterations alluded to above.

Quoting from the report of Commandant School of Instruction, Western Forts, on the practice of 1891, page 9, paragraph 41—

"The keenest interest was evinced by all batteries in regard to the new system of competitive practice. Without entering on any ample consideration of this system, I would remark that it was felt by all to be a much more thorough test of the efficiency of the battery through all ranks. Far deeper interest was called forth from the officers, and every man of the detachment felt that he was conducing towards the hoped-for prize for his battery."

All this is true to the letter and, as a battery and company commander, both before and since the introduction of the new system, I cannot speak too strongly in favor of it as compared to the one in vogue before 1891; instead of the interest in the shooting being confined to a few individuals, it is now shared by every one in the company, greater care is bestowed on the preliminary drills of the latter and a commanding officer pays far more personal attention to the training of his officers, gun-captains, range-finders, and especially his gun-layers than he did before.

Good, however, as it is, generally speaking, the system is not unattended by some disadvantageous effects, which I will endeavor to enumerate.

(1) It induces a commanding officer to train his men more with a view to their doing well at competitive practice, than to their rendering a good account of a hostile vessel.

With our present launches it is difficult to tow a record target at more than seven or, at most, eight miles an hour; in practicing a company at drill, therefore, a commanding officer not unnaturally selects if possible as objective, a sailing vessel or yacht moving at this rate of speed instead of a steamer tearing through the water at 18 or 20 knots, which is what he would probably have to shoot at in actual warfare.

Any one who has practised at Warden or Cliff End batteries at drill at our slowly moving targets and has then tried to change on to the Jersey boat or a torpedo destroyer, will know well what I mean and how many "fresh lays" there will be, especially with young officers and gun-captains when first practising at the rapidly moving objective.

Again, men are generally trained at drill to lay at a vessel broadside on and seldom at those approaching or going away from the battery direct.

(2) One method only of range-finding, the D. R. F., almost invariably being used for competitive practice, other methods are more or less sacrificed to it.

In his report for 1891, page 22, par. 58, the Commandant School of Instruction, Golden Hill, states:

"The D. R. F. system has been more thoroughly worked out than the P. F. Far more time and practice has been devoted to it, the consequence is a far higher degree of perfection has been attained."

Again, in annual report of School of Gunnery for 1893, page 17, par. 22: "Practice with D. R. F. was better than with P. F. throughout."

During his preliminary course of training, rarely lasting more than three

weeks, a company commanding officer has a great deal to teach his men, many of whom are employed during the rest of the year. Battalion and company drill, carbine exercise and physical drill must be perfected, some time must be devoted to repository exercises and single gun drill; is it to be wondered then that when fire discipline is taken in hand the P. F. is shirked and, in view of the competitive practice, all available time given to the D. R. F.?

(3) Under the present system, one day makes or mars a company, it is classed and judged almost entirely by its competitive firing; sufficient importance in consequence is not attached to the remainder of the annual practice, including shooting with the P. F.

Dealing now with the regulations as to the selection of competing gun detachments and gun-layers by the chief umpire.

Before 1893 a company commander selected his four best gun-captains, his four best layers and made up his four best detachments for competitive practice.

In 1893, as mentioned above, this was changed as far as gun-layers went, and out of the four used, the chief umpire now selects two and the company commander the other two out of all the paid gun-layers.

This regulation has, of course, one very beneficial effect; it obliges a commanding officer to bestow great attention on the training of all his layers, and especially on the weakest.

On the other hand it has, I respectfully submit, the following disadvantages:

(1) It introduces a powerful element of luck into the competition.

Out of the, say, one hundred men available in the company, I defy any man living to produce twelve, let alone eighteen gun-layers of anything like equal capacity and it makes every difference in the world to a company's chance of success at practice if the two best or the two worst are chosen. I will illustrate this by what occurred last year to my own company.

In 1895 I produced for competitive practice 14 gun-layers; these might be classed as follows:

Class (1) 1 man—absolutely reliable.

Class (2) 5 men—very reliable.

Class (3) 5 men—fairly reliable.

Class (4) 3 men—uncertain.

Out of these I selected the first enumerated and one of Class (2), the chief umpire happened to select two more out of Class (2), so that out of my six best layers four were selected, "two by honors to begin with."

As I expected not a shot was off the line during the practice, but had two men out of Class (4) been taken the result might have been very different; this year I had not the same luck and lost two hits owing to the selection of a young and somewhat inexperienced gun-layer.

(2) The obligation to keep up so many really well-trained layers necessitates their being changed after pretty well every round during the service practice; this of course does not improve the shooting.

There are really not sufficient rounds allowed for the number of layers;

when the ammunition allotted for shooting with P. F. predicting is deducted, two or, at most, three rounds per gun-layer is all he is able to fire before the competitive.

(3) The present system of selection of layers prevents, in many instances, men working in their own detachments. This is opposed to the great principle advocated in all branches of the service of keeping always the same men together at their work.

In 1895 and 1896 as many gun detachments as possible had to be produced, out of which the chief umpire selected four for the competition.

This change undoubtedly increased in a company the number of men really efficient at gun drill, with the exception of his D.R.F. squad, his signallers and dial numbers, a commanding officer is now obliged to see that all his men are accurately acquainted with the drill of at least one heavy gun; moreover, he has to keep up more really well-trained gun-captains.

It has the following disadvantages:

(1) The element of luck again; this, however, is not nearly so marked as in the case of gun-layers; it is far easier training eight good gun-captains than eighteen gun-layers, and detachments can, of course, be easily equalized.

(2) Subaltern officers may not have their own sub-divisions under them. This is a serious defect which can, I think, have been hardly appreciated when the regulation was framed. On the most important day of the year to the company, professionally speaking, the chances of selection may take away some of his own men from a subaltern and put him in command of others not belonging to his own half company. Is this desirable?

With regard to the use of the record target instead of the Hong Kong; direct hits when firing at the former are, of course, more satisfactory than estimated ones when firing at the latter, when the judging cannot, of course, be absolutely exact. Competitive practice too at a record target causes greater pains to be bestowed on the training of gun-layers than if a Hong Kong is used.

The larger target, however, moves through the water less rapidly and has consequently the disadvantage, as pointed out above, of encouraging the training of men at a slow objective; moreover, if struck low, it easily breaks up, in which case firing has to continue at perhaps only a small portion of the original structure, overs and unders, rights and lefts, having to be estimated, all the disadvantages without the advantages of a Hong Kong accruing in consequence.

This liability to break up introduces another element of luck; a company which does not destroy the target has a better chance of success than one that early in the practice does so, *e. g.*, if the target is smashed the second or third round, just as the battery commander gets his range, great delay is caused and he has to commence his sequence of fire, so to speak, over again; moreover, it is much more difficult judging the errors of shots if the portion of target left to fire at is so small that the correct line of fire is behind it.

For instance, if a piece of the original target, say twelve feet long, remains, a perfect line for the shot is six feet behind it, *i. e.*, where the centre

of the original target would have been if it had not been shot away, now if a shot along this line strikes the water eighty or ninety yards beyond the target it looks a good range from a low site battery even through the best of telescopes, whereas if the original target is in existence the battery commander knows at once that an over shot failing to strike it must be at least the permissible error (about 50 yards at 2000 yards from a low site battery) beyond.

The same remarks apply to judging shots falling short of the target.

It may, therefore, make considerable difference in a company's shooting if the target is or is not broken up during the first few rounds.

To sum up: if a record target could be towed as fast as a Hong Kong, and if it could be so constructed that it would not break up, it is undoubtedly the best to use, under the present conditions it is to my mind a very open question.

Let us now consider whether, without altering the general system of competitive practice, certain modifications might not be introduced with the object of minimizing some of the disadvantages I have spoken of.

What I suggest for consideration is this:

(1) That out of the ammunition allowed to each company for its annual course, a few rounds be handed over to the company commander for elementary practice pure and simple, such practice to be entirely in his hands and to be carried out in whatever manner and with whatever range-finders he wishes, this will enable him to practice his untried gun-layers, etc.

(2) That the whole of the rest of the practice be competitive, the ammunition being allotted in equal proportions to P.F., to P.F. as D.R.F., and to D.R.F.

(3) That a fair proportion of rounds be fired at a single Hong Kong, or the fastest target obtainable, and that it be arranged that most of these rounds are fired when the target is being towed with the tide. Under such circumstances 12 to 15 miles an hour is attainable with a steamer of the *Osprey* type.

Suggestion number (2) at once sweeps away the disadvantages of the present system of selection of gun detachments and gun-layers for the competition by the chief umpire, for all gun detachments and all gun-layers can now take part in the competitive practice.

Subaltern officers can throughout command men of their own half companies and layers can be employed with their own sub-divisions. The element of luck vanishes.

This suggestion, moreover, at once prevents preference being given to any particular method of range-finding and obliges a commanding officer to train his men equally carefully in all.

I submit also that this arrangement is a truer test of the efficiency of a company than a single day's practice, which may be marred by bad weather or a crowded range.

Suggestion number (3) encourages a commanding officer to train his men at rapid objectives.

Until an automatically moving one is introduced, it is, of course, im-

possible to shoot at a target approaching or departing from a battery direct, and in consequence men are rarely trained to lay on such an objective, some practice might, perhaps, be obtained by anchoring 5 or 6 barrel targets in line and shooting rapidly at them in succession, taking the furthest first to represent a vessel approaching and the nearest first to represent one steaming away from the battery.

I believe a Brennan torpedo has been used to shoot at, but the installation below Cliff End battery is, I fancy, the only one possibly available for this purpose.

I am aware that these proposed changes have their disadvantages, some companies do not get the same chance of practising with P.F.'s that others do; on the other hand, under the present arrangements, companies, who man casemated forts where a D.R.F. is never used and where men never lay or practice with straight-edged sights, have to carry out their competitive practice with this method of range-finding.

These matters can be equalized when grouping companies for the competitions. Combined practice also creates some difficulties, as one fort is easier to shoot from than another; still this can be to a great extent neutralized by having two days' combined shooting, when, of course, one company would take one fort one day and another another.

The duties of the umpires would, undoubtedly, be more complicated and arduous, but still, I think, would present no insuperable difficulties.

Should the idea of spreading the competitive practice over several days' firing be not contemplated, I would, in order to eradicate the element of luck, suggest the following modifications in the selections of gun detachments and gun-layers by the chief umpire.

Each half company to produce as many detachments as possible—as a rule this is four, or two per sub-division—the chief umpire to select one out of each sub-division or, at any rate, two out of the half company; this will insure the half company officer having command of his own men and will equally insure the same number of well-drilled detachments as under the present system.

With regard to layers, I should propose that two per competing detachment be told off and that they be changed in the middle of the practice. This will prevent any luck as to selection and will insure the layers being employed with their own sub-divisions.

I am aware that this arrangement necessitates the production of only 8 gun-layers for the competitive, but a commanding officer would have to keep up at least 4 or 5 more in reserve in case of casualties among his 8 best.

Differences in local conditions would probably necessitate the biennial competition for the D.-A.-G.'s cup being confined to one day's practice only, still this need not interfere with the adoption of the methods I have suggested for the group prizes.

Military Notes.

DIFFICULTIES OF THE DEFENSIVE.

MAJOR C. B. MAYNE, R.E., delivered at the Royal United Service Institution the first and second parts respectively of a lecture on "The Difficulties of the Tactical Defensive and how to meet them." In the first part of his lecture, Major Mayne, premising that the subject ought to be considered separately in its two branches of strategy and tactics, but that time would not allow him to deal in any way with the strategical defensive, the study of which should never be undertaken until a thorough grasp had been attained of what is entailed in the expression "the tactical defensive," observed that the object of each side in war, and especially in battle, was to disorganize and to demoralize the enemy, that is, to break up his organized units, and so to render them incapable of direction and control, and to frighten them into retreat or laying down their arms. In strategy an army could be disorganized and demoralized by depriving it of its means of existence, and by defeating it in detail. But the means of disorganizing and demoralizing the enemy on the battle-field were fire and shock, that was, by distant destructive action and by the close application of brute force.

The spirit of war demanded that both sides should take the offensive. As a matter of fact, only one side did this, because the political, strategical, administrative, and tactical circumstances of the case forced one side—whether it desired it or not—to act on the defensive. So that the choice of the offensive or defensive was not, as a rule, a free one. Whichever side at the moment of collision was relatively inferior from strategical, administrative, or tactical considerations, that side adopted the defensive, not because it desired to take up that attitude, but because it could not help it. Political reasons also may demand the defensive as a matter of policy. The offensive in war was the sword, the defensive the shield; and to win in war the sword must be used. The purely defensive could never win.

The primary object of the defensive was to enable a small body to effectually resist a larger one until the latter had been so weakened that the former could attack it successfully; that was, until the relative strengths were inverted. The secondary object of the defensive—one that grew out of the primary object—was to enable a body to gain time by its power of resistance, so as to allow of the free action of another body acting elsewhere, or which was coming up to reinforce it.

The advantages of the tactical offensive were that the assailants gained the initiative in making movements, and could choose the time and place of assault; they gained also the great moral effect produced by forward

movement, and by being able to lay down the law to the defenders; further, the offensive alone could procure decisive results. The disadvantages of the tactical offensive were that the troops of the assailant had to continually move forward, and thus had to expose themselves to the enemy's fire, suffering much loss, and to keep changing the sighting of their rifles for imperfectly guessed ranges; the rapid movement of the advance made the men breathless, and so reduced the efficacy of their fire; reinforcements were hard to effect without mixing units, which only led to loss of control; and it was almost impossible to keep an advancing body of men effectively supplied with ammunition.

The advantages of the tactical defensive were the selection of the ground to fight on, and its fullest utilization for battle purposes; the position could be strengthened by field defenses; the men did not undergo any physical exertion to disturb their aiming, but fired from a stationary base over known ranges, and thus their fire should be very efficacious; the men, being covered, should not suffer much from the enemy's fire; the supply of ammunition was easy, while stricter supervision could be maintained over the fire, which was also easier to control; the disposition of the troops was concealed, and the defenders had a complete knowledge of the battle-field. The disadvantages of the tactical defensive were the uncertainty of the direction of the enemy's attack; the bad moral effect of the men having to remain for a long time stationary under the disturbing effects of the enemy's fire and of seeing him gradually advance; and that the defenders had to follow the moves of the assailants. These disadvantages, however, could be largely minimized by making use of sorties or counter-strokes, which should form the soul of the defense from the moment that the enemy arrives at about 400 or 500 yards from the position.

Thus the advantage of the offensive were chiefly of a moral nature; while those of the defensive were of a material nature. And as the offensive alone could procure decisive results, and as the attack was easier to carry out than the defense, every defense that sought for decisive results must, sooner or later, pass to the offensive, both to gain the desired decisive result and also to shake off the difficulties that surround a defensive attitude. The commander who deliberately took up a defensive position with the determination of fighting it out with the enemy on that one spot would, unless the circumstances of the case were extremely favorable to such a decision, lay himself open to very serious disaster if he were opposed to a well-trained enemy led by an energetic general; and therefore, although a defensive attitude might be decided on as a mode of temporary action, yet the actual locality on which it is to be applied should only be looked upon as conditional to what might take place. And here was presented a most serious difficulty that the defensive had to accept—it must be prepared to fight, and yet be prepared to retire in the face of a pursuing enemy to another position further in rear, or to a flank. The first great difficulty for a defending general was to determine whether the enemy would attack at all, and, if he did attack, his next difficulty was to determine the direction of the enemy's decisive blow.

An army being composed of impressionable men and horses with nerves, the effect of fire on them was a most serious fact to be considered; and we were confronted with this difficulty, that we did not know the battle effects of modern weapons. Some writers were of opinion that the battles of the future would entail greater proportionate losses than in the past, but, so long as human nature remained impressionable, so long would it yield before danger when that danger had been sufficiently impressed on it. The resisting power of troops was far more of a moral than a physical question; and hence disciplined troops could stand greater losses than raw troops. The only effect of improved weapons would be to produce the desire for retreat at longer ranges than in the past, the moral factors being supposed equal in each case. So far, however, as peace experiments could be relied on for giving data for war experience, the artillery arm had gained more than infantry by modern improvements in weapons, in the power of producing demoralizing and disorganizing effects on hostile troops. In fact, the relative importance of artillery had risen largely of late years.

A very crucial feature in all defensive arrangements was the question of time. The defender wanted time far more than the attacker—the defender wanted time to make his preparations before the enemy's projectiles began to arrive; the assailant was not tied by this desire, and in all defensive problems it was extremely important to deal with each one of them under different conditions of available time and strength of force.

A point that must be seriously borne in mind in taking up any defensive position was the problem of water-supply. In fact, the question of the supply of water and food was of vital importance to all troops, whether on the offensive or defensive; but often the defensive position, being on high ground, was at a considerable distance from the source of water-supply, and hence arrangements should be made to enable the troops to be supplied with water and other necessities of life at intervals during the day, for they got very thirsty in the excitement and distress under the exciting conditions of battle. Whether the battles of the future would be of longer or shorter duration than those of the past was a question; but should they last for two days, as some writers predicted, then in addition to the supply of ordinary wants, we should have to arrange for the actual replacement of the first-line troops during night time so that the battle might be continued at daylight with troops whose nervous energy had not been used up.

Major Mayne, in the second part of his lecture, delivered yesterday, expressed the view that the "pivot of manœuvre" principle was the key that unlocks the difficulties of the defensive either when applied tactically on the battle-field or when applied strategically on the theatre of war. The disadvantages of the defensive were chiefly moral, and, therefore, the means of overcoming them must also be chiefly moral—viz., by demoralizing the enemy by concentrated fire over known ranges, by the use of field defenses as "temporary pivots of manœuvre," in order to economize men and heap up reserves, and by the use of these reserves in opportune local and general counter-strokes. These means applied, each in their own sphere, to the defense of small localities, or of long positions embracing several of such localities, or of a large area of country when carrying out a defensive

strategy. In this last case, the pivots of manœuvre would be the fortresses and entrenched camps or positions of the country round which the field armies would manœuvre and strike at the flanks of the enemy after he had become engaged with the garrison of the pivot of manœuvre. In the first case, that of a small locality, the principle of pivots of manœuvre with offensive movements made on either or both of their flanks also found not only a ready application, but it was the only method of procedure that promised any assurance of success. Within a locality, counter-attacks were really the only means of compelling the retreat of the enemy, especially if they were directed on the flanks and rear of his detachments. Thus on a large or small scale the defensive found its best use in being applied in conjunction with the delayed offensive. A part of the force acted on the defensive in a defensive position, and while the enemy attacked this position he was counter-attacked in flank by another powerful force. It was the same idea as was involved in the principle of "temporary pivots of manœuvre," combined with a striking or manœuvring force, which struck at the psychological moment, or moment of demoralization in the enemy's ranks. The German manœuvres of 1895 afforded very good illustrations of the principles advocated.

The great difficulty in the matter lay in our not being able to properly realize moral effects in peace-time; and the consequence of this was the universal neglect of rehearsing the proper method of defense in peace manœuvres. Another great difficulty lay in the choice of the right moment for delivering the various local and general counter-strokes. Again, the change of the attitude of the whole force from the defensive to offensive was by no means an easy operation. The consequence of all these difficulties was that "higher qualifications are required to make an able defense on a large scale than to direct an attack with adequate means." However, by acting on certain principles, involving a reliance on the operation of the moral factors of human nature, many of the difficulties of the defense which chiefly arise when the fight rages within a short distance of the main position were completely met by the actual transference of the close range fighting from the vicinity of the defensive position to the vicinity of the line of attack, thus transferring to the attackers the rôle of the defensive with all its difficulties. But to enable this to be done, the physical features of the position must lend themselves to the application of these principles. The necessity of the defensive acting on the offensive was admitted by all writers, though they usually failed to state in more detail how this should be done.

If the object of battle was the annihilation of the enemy's means of resistance, and if the offensive was the only way of procuring a decisive result, then the defensive must be abandoned before the end of the fight, and the offensive vigorously assumed, or else defeat would have to be accepted. By accepting these principles of action, the near defensive close to the position became a thing as little thought of as defeat, because it was now transferred over to the enemy in front of the position by having been changed into the offensive. The truest principle of war to act on was that the secret of success lay in a bold and energetic offensive, and not in passive

resistance, and that, therefore, a general counter-stroke could alone win a decisive victory for the defensive.

The chief points to be carried out in defending a tactical position that it has been decided to hold were: The position should have such a gentle slope to the front as to form no impediment to the execution of counter-strokes, and there should be a clear field of fire for as long ranges as possible. The position should be divided into defensive and offensive portions—*i. e.*, into pivots and fronts of manœuvre. The pivots of manœuvre should be strengthened and covered with obstacles invisible at a distance to the enemy. The guns should be massed so that they could, by their concentrated fire, defend their own front in day time, and be able to turn their fire in any other direction. The infantry would be on the flank of the guns disposed in three lines—the first to form a shooting line with the usual supporting troops, the second to form local reserves to protect the flanks and execute local counter-strokes along the front of the position, and the third to form a general reserve to execute a general counter-stroke; the pivots of manœuvre to have their own special commanders and reserves. Ample reserves should be collected behind the offensive portions, or fronts of manœuvre, of the position. The more difficult the nature of the ground and the greater the advantages it gave the enemy, the greater must be the amount of the local reserves allotted to that point; the flanks came under this description. There should be maintained on the enemy a continuous and well-directed infantry and artillery fire, delivered from covered emplacements and trenches and over known ranges, for the purpose of demoralizing and disorganizing the enemy's troops as early as possible. The local reserves should be employed in opportune local counter-strokes as soon as the enemy got to within 500 yards of the main position. The general reserve should be employed in a general strategic counter-stroke to decide the battle when the enemy was felt to be sufficiently exhausted. A pivot of manœuvre should be constructed in rear as a "rallying" position, and arrangements made for the regular and frequent supply of ammunition, water, and food to the troops, especially to those in the front line, and for the collection and transmission of information to head-quarters.

From the foregoing it would be seen that entrenchments, or field defenses, found their highest value and truest use as pivots of manœuvre acting as tactical supports in battle. And in the words of Lieut.-Colonel G. F. R. Henderson, whenever a general has thought more of maintaining his ground than of annihilating his enemy, whenever he has let his enemy's blunder go unpunished, when he has neglected his opportunities of dealing with him in detail, when he has trusted to his entrenchments to win his battle and not to the vigor and timeliness of his counter-strokes, then the strongest position, the most elaborate system of entrenchments, have proved but a broken reed. "Entrenchments," says Meckel, "are the shield of the defensive; the counter-stroke is the sword."—*United Service Gazette*.

GUNS OF H. M. S. PRINCE GEORGE.

The 12 in. gun, two of which are situated in each barbette of H. M. S. *Prince George*, is 40 calibres in length, its full length being 445½ in. or 37

ft. $1\frac{1}{2}$ in., and it weighs 46 tons. The entire gun from muzzle to breech is wound with wire, and the outer course over the wire is composed of two tubes only, that over the chase portion being considerably longer than half the length of the gun. A short screwed hoop makes the connection between these two where their ends abut. A notable feature is the double barrel consisting of two concentric tubes, the inner one fitting exactly throughout its entire length into the outer one. This arrangement has been designed with a view to facilitating and cheapening the relining of the gun, as the entire inner tube or a portion of it may be withdrawn at any time and replaced at comparatively slight expense, making the gun practically as good as new. The wire or ribbon used on these and on the 6 in. gun is $\frac{1}{4}$ in. wide by 0.06 thick, and its ultimate strength per square inch of cross section lies between 90 and 110 tons. It is wound on in a number of separate sets of layers, the tension varying between about 30 tons to 60 tons per square inch, according to the position of the layers. The actual weight of wire on each 12 in. gun is approximately 12 tons, corresponding to a length of nearly 100 miles. The projectile fired weighs 850 lb., and the bursting shell is over 5 ft. long. With the full charge of $167\frac{1}{2}$ lbs. of cordite, a muzzle velocity of 2400 foot seconds is obtained, the muzzle energy reaching 738 foot tons per ton of gun—a figure far exceeding anything before obtained with large ordnance, corresponding to a perforation of wrought iron by Krupp's formula of nearly $31\frac{1}{4}$ in. at 2000 yards. These guns can be fired from the fixed loading position at the rate of four rounds in five minutes, which is nearly double that of the guns of the *Royal Sovereign* class.

There are also twelve 6 in. quick-firing guns, all mounted in armored casemates, eight being on the main deck and four upon the upper deck. Sixteen 12 pounder quick-firing guns are mounted upon the main and upper decks, the latter being behind the vertical walls beneath the boat deck, and between the corner casemates of the upper deck, so that their positions are sheltered from raking fire by the casemates. The armament is completed by twelve 3 pounder Hotchkiss guns in the fighting tops on the masts, two 12 pounder 8 cwt. quick-firing boat and field-guns, and 8 0.45 in. Maxim guns, mounted in various positions upon the superstructure. Twenty-two torpedoes will be carried, which can be fired from four submerged tubes, two forward and two aft, and from one above-water tube at the stern.

The six inch guns were manufactured at the Elswick works. They are of wire construction. They are 40 calibres long, the total length from breech face to muzzle being $249\frac{1}{4}$ in. Broadly speaking each gun consists of a long tube technically known as the A tube, or barrel bored out to exactly 6 in. diameter for the greater part of its length, the chamber section being tapered to allow of the free removal of the brass cartridge case. On to the rear portion of this tube is contracted a second tube, and round this is tightly bound the steel wire or ribbon, the tension varying in successive layers, according to the principles formulated by Mr. Longridge. Over the wire is lightly contracted a jacket, on which are cut the steel keys designed to prevent any rotation of the gun by the inertia of the shell in the rifling, and to cause the gun to recoil in a straight line. Finally, over the muzzle half of the A tube a chase hoop is shrunk on, and over the rear end of the

jacket is screwed and contracted the breech ring, from the lower side of which projects a stout arm to which the piston rod of the recoil cylinder is secured. The breech mechanism of these and the 12 pounder guns is of the usual Elswick quick-fire pattern. The breech screw is made on the interrupted screw principle, a part of a turn being sufficient to unlock it. But it differs from the screws of other makers in having its front half steeply tapered, the interruptions on this part coming opposite the full thread on the parallel part; the pressure is thus very much more evenly distributed round the gun than in the case of a parallel screw. The taper is at the same time necessary to allow the action of the breech mechanism, as will be seen presently. This mechanism consists of a strong bronze carrier, hinged to the right side of the breech ring. It supports, on a large spigot formed on its face, the breech screw. Rotating round the carrier hinge pin as a fulcrum is a long curved lever, which passes right across the breech of the gun when closed, and terminates in a handle. Attached at a point along this lever is a link, the other end of which is hinged to a block sliding in a guide cut in the carrier. Into this block fits a pin, secured at right angles to the rear face of the breech screw, and at some distance from its centre. Suppose now that the breech is closed ready for firing, the long lever and the link lie close against the breech screw, the sliding block being pushed to the limit of its stroke in the guide in the carrier. To open the breech the lever is pulled steadily backward from the gun, just as if the breech were closed by a simple valve or door. This action puts a tension on the link, which in consequence draws the slide block toward the carrier hinge, and this movement must evidently cause the breech screw to receive a partial rotation through the medium of the pin in its face fitting into the block. The continuation of this movement of the hand lever after the unlocking action is complete causes the whole carrier to swing on its hinge, bringing the breech screw out with it.

EXPERIMENTS IN MILITARY BALLOONING.

A series of experiments are being made at Shoeburyness by the officers of the ordnance department and the superintendent of experiments at the school of gunnery on the one hand and the officers of the school of military ballooning at Aldershot on the other, says *Public Opinion*. A captive balloon was sent up over the estuary of the Thames, attached by a cable of about 700 yards to a boat loaded with ballast, which was set adrift on the water. The weather was somewhat boisterous, and the morning dull and hazy. The field piece was placed on the marsh land beyond the school of gunnery, from where the firing took place. The distance or range was ascertained to be about 4000 yards. The gun was worked by the staff of the school of gunnery, under the direction of Major Hickman, R.A., assistant superintendent of experiments. Shrapnel shell was used, and good practice was made from the first. On the sixth round, however, excellent elevation and direction and distance were obtained, and the shell was observed to burst almost immediately over the balloon. After oscillating for a few seconds, the balloon was observed to be collapsing, and then it gradually fell. Its descent was slow, and, as far as could be judged, had the car con-

tained any occupants, it is possible they would have sustained but little, if any, injury had the balloon fallen on land. When it was seen that the balloon had been injured and was descending, the boat to which it was captive was picked up and towed to land, and the balloon was packed up and later in the day sent back to Aldershot. It was impossible to ascertain the extent of the injury which was done to the balloon itself, but the wicker car appeared to have sustained little or no damage. The experiments were at once suspended, and a report was drawn up and forwarded to the War Office.—*The Scientific American*.

BALLOONING.

Balloonng for warlike purposes has made immense strides since the subject received the official recognition of the War Office and a series of experiments, to which we have referred from time to time, were commenced at Aldershot. Despite, however, the great attention which has been devoted to the subject in England, it is from Austria that we receive particulars of experiments of the most important character. These experiments, which have been carried on at the fortress of Steinfeld, near Vienna, were intended to show the effect of artillery attack upon balloons. It is evident from the result of the experiments that the balloon has only one enemy—namely the cannon—and that small holes produce an inconsiderable effect even in large numbers. The difficulty of laying the gun increases with the altitude of the balloon; sometimes it is found necessary to dig a hole for the trail, which makes the service of the gun slow and difficult. The balloon, therefore, should be as high as is consistent with effectual observation. The Austrians think that an altitude of about 800 metres (2625 ft.) has the advantage of spoiling the enemy's fire while allowing observations to be made. About 4000 metres distance (4375 yards) places the balloon outside the effective range of field artillery, without being so far off as to prevent the points which it is desired to examine being distinguishable. Lastly, any motion of the balloon, vertical, or lateral, renders artillery attack specially difficult.—*The Army and Navy Gazette*.

A FOLDING BICYCLE.

The bicycle, as ordinarily constructed, has only one real fault, which is that it is a clumsy machine to transport. It is difficult to ship an uncrated bicycle by rail or water without its running some risk of being injured. The folding bicycle largely obviates this difficulty and also permits of the wheel being stored in houses with great convenience, but the folding bicycle has another and often more valuable use. In France, where the bicycle has been made considerable use of in military manœuvres, the folding bicycle has been used with great success. The construction of the ordinary bicycle, valuable as it is in transporting soldiers, becomes, as soon as he dismounts, a hindrance to his motions and a burden which cannot be carried with ease, but must be trundled along.

Under such circumstances it is difficult to see how a soldier can handle a gun. If he lays his bicycle upon the ground, it runs a great risk of being injured and would offer an impediment to the free movement of the troops, and, if surprised by the enemy, it may cost him the loss of it; like

a rider without a horse, he would be very liable to be captured. Military bicycles often have to be transported very long distances through woods and swamps and hoisted over hedges and walls. The difficulty appears to have been solved by causing a machine to be constructed which can be carried by man when man cannot be carried by the machine. Various devices have been made to permit this folding. We illustrate an American invention of this class, the wheel in our engraving being made by the Dwyer Folding Bicycle Company, of Danbury, Conn. This bicycle has been put to actual use in military manœuvres and has been found very satisfactory. The Dwyer machine is arranged so that both diamond and drop frame wheels can be built capable of folding.

In the diamond frame wheel the joint is arranged in the middle of the frame, and in the drop frame wheels a similar plan is employed. The wheel is manipulated as follows: Stand on the left side with the left hand on the handle-bar (to keep the front wheel from falling around) and the



right hand on rear brace. Then press bolts forward and into recesses in locking tube, and with right hand lay rear wheel around against the front. If an ordinary handle-bar is used, set the handle-bar and saddle so that the handle-bar will go under or over the horn of the saddle. Special handle-bars make the folding more compact. The military wheels are especially ingenious and do not differ much in appearance from the ordinary drop frame wheel. It is the work of an instant to fold the bicycle. The soldier can then have free use of his hands to assist him in climbing or handling

his gun while the wheel is hung over his shoulder. The folding bicycle proves especially valuable to those who wish to make excursions on boats and cars. The wheel can be folded up and placed in the cabin of a very small yacht. The folding bicycle is especially convenient when it is desired to take it into the house, and the wheel is reduced to so small a compass that it can be readily packed in a trunk or box. The wheel has as much strength as the ordinary bicycle and it weighs only twenty-five pounds.—*The Scientific American*.

GERMAN FOLDING BICYCLE.

The Germans are not far behind the French in the matter of a folding bicycle. Messrs. Seidel and Naumann, of Dresden, have invented a machine, briefly described and illustrated in the *Militär-Wochenblatt*, which seems to have much in common with the cycle of Captain Gérard. It is a rear-driving safety machine with 26 in. wheels and pneumatic tires, and weighs less than 36½ pounds. It is specially adapted for military use, and when the man dismounts he can do so by merely placing his feet upon the ground, in which position the cycle is held in position between his legs, and he has both hands at liberty and can load, aim, and discharge his rifle, and immediately after be *en route* again. Like the French cycle, that of Messrs. Seidel and Naumann permits one wheel to be folded upon the other by means of a hinge-and-bolt mechanism in the strong double framework, and, so folded, can be suspended on the rider's back without greatly impeding his movements. No official trial of the machine appears yet to have been made, but Lieutenant von Holleben, of the First Royal Saxon Life Guard Regiment, who rode it in the manoeuvres of 1896, found it satisfactory by day and night in all weathers, and on all kinds of roads. Herr W. Stavenhagen, who describes the machine in the *Militär-Wochenblatt*, regrets that, while German warships are built wholly of German material and Krupp's factory is "the first in the world," Germany has to purchase steel tubing for bicycles either from England or America.

A NEW ARTICLE OF FOOD.

Some of the troops garrisoned in Paris are now fed on a new article of food called *Graisse de Normandie* (Normandy dripping). Mutton tallow, from which the parts containing blood have been separated, is melted over a hot fire and cooked with the following vegetables: To every 100 pounds of tallow 5 pounds of carrots are added, 7 pounds of leek, 7 pounds of onions, 1 pound of celery, 500 grains of parsley, 500 grains of garlic, 50 grains of thyme and laurel leaves, also salt, pepper, and nutmeg. After this *olla podrida* has boiled for several hours the whole soup is put through a sieve, and the vegetable stuffs are thrown away. The remaining mass is formed into bricks, which can be easily made into soup by dissolving them in water over the fire. The food is said to be liked by the men and is very nutritious.

A NEW RIFLE.

The new rifle, styled "Mannlicher Model, 1896," whether it ever be adopted as a military weapon or not, has some interesting features which are mentioned in the last number of *Arms and Explosives*. It is question-

able whether any reduction of calibre beyond what we have arrived at in the Lee-Metford would be an advantage. The likelihood is that it would be quite the contrary, as the power to stop the rush of an enemy is already small enough in the projectile which we now use. The Austrian manufacturers have nevertheless turned out a magazine rifle, superior in many respects to any of its predecessors. Its calibre is .234, its muzzle velocity 2527 ft. per second, and its weight 7.7 lbs.; the bayonet adds .75 lbs. to the weight of the whole. It is claimed for the breech mechanism that, although of much reduced proportions, it is far stronger and more durable than that of more weighty military arms. The number of component parts is lessened, and the work of taking them to pieces is simplified. The barrel is entirely surrounded by the stock, and an improved attachment is provided for the bayonet, both of which precautions will protect the piece from the effects of rough work.

HORSE POWER OF MODERN GUNS.

One might be accused of romancing were he to assert that a gun is of several million horse power, and yet nothing is more exact, says the *Engineering and Mining Journal*. The 100 ton gun, with a 550 pound charge of powder, throws a projectile weighing 2020 pounds at an initial velocity of 1715 ft. per second. It communicates to it, therefore, a live power or kinetic force of 92,597,000 foot pounds. The thrust exerted by the gases due to the ignition of the powder lasts less than a hundredth of a second. The result is that during the active period of the work of the powder in the gun the mean power is greater than 87,000,000 foot pounds per hundredth of a second, say 8,700,000,000 foot pounds per second. This represents a power of 12,000,000 kilowatts, or 17,000,000 horse power. There is, unfortunately, another side to this picture. Although large guns are extraordinarily powerful, their active life is essentially ephemeral, since, after 100 shots, they are generally out of service. They have then worked actively one second! The same calculation applied to modern guns that throw 2200 pound projectiles, and communicate thereto an initial velocity of 1970 ft. a second, demonstrates, further, that such guns, during less than a hundredth of a second each time, develop a formidable power of 13,050,000,000 foot pounds per second, say 24,000,000 horse power.

MEDICAL TREASURE TROVE IN SWITZERLAND.

Our knowledge of the medico-military organization of ancient Rome owes not a few of its most distinctive details to Switzerland, says the *London Lancet*. Windisch, for example, the Vindonissa of antiquity, has proved to the Swiss archæologist a real mine of surgical treasure trove, lying as it does at the junction of the Aare and the Reuss and commanding on the one side the two Italian highways (from the Great St. Bernard and from Como) and on the other the communications with the Rhine and Danube.

Here was found the celebrated monument with inscription to Tiberius Claudius Hymnus, surgeon of the Twenty-first Legion. Here, too, has been unearthed quite an armamentarium chirurgicum in the shape of medicine chests, instrument cases, with pincers, scalpels, needles, catheters, and

such like in fine preservation. Dr. Conrad Brunner, of Zürich, has based on these discoveries a highly interesting monograph entitled "Die Spuren der Römischen Aerzte auf dem Boden der Schweiz," and the enthusiasm he has awakened in the medical branch of archæological research bids fair to fructify in even more precious discoveries. Not many days ago there was disinterred at Baden-im-Aargau, not far from Windisch, a Roman house containing fourteen apartments, varying in size, and with walls painted with designs of the highest interest for the classical scholar. When exposed to the light of day there appeared about the structure a number of fibulæ and vases and in the apartments themselves such a quantity of surgical instruments as to favor the conclusion that the house was neither more nor less than a hospital. This is in many respects a novelty in medical archæology. We have very clear notions as to what the valetudinaria or infirmaries for slaves on patrician estates were like; but a building for the wounded or ailing Roman soldier presents points of interest, as hitherto no such buildings have been found in their integrity. Moreover, when we add that never either in Switzerland or in any other scene of Roman military occupation has there been found so large an assortment of surgical instruments as in this newly discovered hospital near Baden, we have said enough to awaken scholarly and professional curiosity in the spot and to lend additional attraction to the picturesque "Kurort," known since the first century A. D. on the banks of the Limmat.

TETRA-NITRO-CELLULOSE—A NEW EXPLOSIVE.

When dinitro-cellulose, or ordinary soluble pyroxylin, is further acted upon by means of a mixture composed of equal parts by volume of nitric acid 1.5 density and concentrated sulphuric acid, there is, as is well known, produced a true trinitro compound, differing entirely from either of the above compounds as regards its solubility, and at the same time possessing far enhanced explosive properties.

If the resulting compound thus formed is again treated with a still more energetic dehydrating agent, composed of equal parts by weight of commercial vitriol and phosphoric anhydride, a further nitrogenous compound is obtained, which, after the usual washing and drying, presents a much more brittle structure than any of the preceding derivatives, in some cases even admitting of pulverization, and altogether a much more formidable compound, even exploding by mere percussion, its explosive violence as compared with the former bodies being more than double.

When the compound is digested in a strong solution of potassium chlorate, and carefully dried, it is rendered extremely brittle, and thus readily admits of being pulverized, forming a true percussion agent. As far as can at present be ascertained, the new explosive represents a tetra-nitro compound; but owing to its formidable explosive properties, necessitating considerable care in handling the same, further investigations are considered necessary in order to arrive at a correct formula. The compound, when submitted to destructive distillation, in contact with moist caustic potash, evolves hydrogen gas, together with large quantities of methylic alcohol.—*Chemical News*.

Comment and Criticism.

I.

"Proper Military Education."

Capt. J. S. Pettit, 1st Infantry.

WHEN I read Major Wagner's criticism of my essay, I was reminded of an anecdote I heard some time ago. A gentleman was knocked down on Broadway by a cab. The front wheels passed over him, and as he saw the hind wheels approaching, he exclaimed, What! Again! I have no intention of answering Major Wagner at length or in kind. Extensive notice would tend to supply lacking dignity. In matters of mere opinion the judgment of the readers will suffice. "Inferences" are purely personal, and have no material weight as evidence. Personality and sarcasm may be successfully used by great wits in heated debate and by youths who mistake them for calm arguments. Ordinarily they are accepted as indications of weakness in the cause, or the writer, or both.

I am aware that any group of men at West Point, Fort Monroe or Leavenworth, might extract the essay to suit their own views, and find much to criticise. There are as many different views of the Bible as there are sects in Christendom, infidels, agnostics, and others. Its value to mankind has not been seriously impaired by adverse criticism.

The atmosphere at Leavenworth seems to be extremely sensitive and easily put in motion. It is impossible to determine which is most unpleasant to them, praise or fault finding. I have no prejudice or feeling of unfriendliness towards the school, and still believe, as stated in the essay, "that it is unfortunate that it cannot give to all lieutenants of infantry and cavalry the advantages it offers to a few." If its sentiments are voiced by those who appear for it in public print, I may change my views.

No one is better qualified than the Major to speak authoritatively on the Infantry and Cavalry School. He has been identified with it almost since its origin. No one desires to rob him of one jot of the credit to which he is clearly entitled for his good work, but his public utterances would have greater weight if he would show more toleration for the views and opinions of others and curb an irresistible desire to be sarcastic, or amusing. It savors of the "New Journalism," and diminishes the weight of his arguments.

Some of his criticisms are mere amplifications of those of Colonel Hawkins, to which I have already replied. Others are merely matters of personal opinion upon which we may reasonably disagree without prejudice to either, such as, *Is the Infantry and Cavalry School "wholly" a post-graduate school?*

It has had, and will continue to have, many students who are not graduates of any college or university, and more who are not graduates of any military school. If these men can start on equal terms in Law, Ordnance, Gunnery, Military Engineering and Art of War with the graduates of the Military Academy, who are supposed to have had rigid training in those branches, there is something loose somewhere, and the sooner we locate it the better for both schools.

The Secretary of War, in his report of 1896, says, "by degrees its character has undergone some change, in many respects taking the character of a post-graduate school." We presume the Secretary's information was of the best quality. The Major frequently refers to the work for 1896. No doubt it was excellent, and we would agree upon that point. He knew very well that the report was dated Aug. 1, 1896, and was probably not

in the hands of the public until some weeks later. As my essay was turned in in June, 1896, I had no access to any information and must be acquitted of any desire or intention to overlook *any* work of that year. As to whether the school is properly adhering to the object of its existence or not, I refer the curious to pages 27 and 28 of the Major's report in the Annual Report for 1896. We may have different views as to the "object of its existence." This would not, of course, occur to the Major in preparing his peculiar style of criticism. My idea of this object can be stated briefly. If it is to remain a school for young lieutenants of various and unknown abilities and previous training, it should retain its name and make the course adhere to the needs and abilities of students. If it is to be made a "War College," in the usual acceptation and meaning of the terms, then it should have selected students, officers of rank and experience, who can demonstrate that they are prepared to give two years' time to the study and investigation of the highest and most intricate features of military art and science. It seems to me that middle ground would be mere temporizing with proper military education. Personally I do not believe we are ready for a War College. I do not think that our service training has reached the stage at which a War College is a necessity. Certainly not for 2d lieutenants. Some of my friends differ from me, but I do not find that any reason for personal abuse or a wordy tirade about nothing.

If it is impossible to maintain separate courses in infantry and cavalry, why not put them *all* under "military art," as the commandant suggests, and *double* the value of that department? For one I regret to see "infantry (including practical exercises) placed below law and engineering in a practical infantry and cavalry school." I note the Major's explanation of the difficulties surrounding this question and think it is a good one. I still adhere to "the importance of the terrain in military operations," but do not confound it with map making and surveying.

The Major grows eloquent when he reaches the statement that "*all of our schools have suffered severely from lack of good instructors*," and loses his eyesight just at the end of the paragraph. He is an expert at "extracting" an article to suit his own purposes. I will quote the one immediately following. He forgot to do so.

"It is no disgrace to say of an officer that he is not a good pedagogue. Teaching as an art can be acquired only by long years of experience. If a man has no fondness for it and lacks the personal characteristics which win the students' esteem and confidence, he will never succeed. It is remarkable how very few really good instructors are found among men who adopt teaching as a profession.

"When we find a first-class instructor, we should keep him. His services are of vastly greater importance in assisting in the training of young officers than in doing routine garrison duty."

I am sorry the paragraph he refers to came under "The Infantry and Cavalry School," because some of its officials are particularly sensitive. The word *all* is a good old English word, and its meaning cannot be missed save by a great effort. The Major does not seriously combat the statement, but takes refuge in a eulogistic paragraph on his *confrères*. We are all in the same category. It is fortunately not permitted to us to know whether we are classed as "bad" or "good" by our judges. I give every man credit for as much purity of motive and honest endeavor as I claim for myself. Let us glance at some reasons for my statement.

1. Teaching school is an *incident* in an officer's career, and not the goal of his ambition.
2. Teaching is an art acquired only by long practice, and in many States a normal school certificate is necessary to secure a position as teacher in the public schools.
3. Instructors are sometimes detailed without much previous knowledge as to their fitness, and are allowed to remain when they should be relieved.

4. They are detailed to teach subjects in which they have no especial interest, for instance, a man fond of languages, teaches mathematics and *vice versa*.

5. They have been detailed to teach in subjects in which they have shown no unusual proficiency and have had no especial training—such as an artilleryman teaching engineering and a cavalryman teaching ordnance and gunnery.

6. Officers have been detailed to teach against their will. Like good soldiers they obey but cannot be heart and soul in the duty. It takes two or three years to make a good instructor of a man who has fine qualifications at the start. He is generally relieved shortly after he has become well fitted for the work. The Major is an exception.

If the Infantry and Cavalry School has been, or is free from these troubles, then it is not included in the statement, and I will be the first to heartily congratulate it on its remarkable good fortune. Each man can make an introspection of himself and appropriate to his own use and benefit, as much of the remark as he thinks justly belongs to him. I have, and have always had esteemed friends, in the Leavenworth faculty. They are perfectly aware that I would not offer them a gratuitous insult at any place or time. The incident is closed so far as I am concerned.

He again "extracts" a sentence for himself, as follows: "We need go no further than the War of the Rebellion for ample proof that soldiers are frequently born and rise to eminence through inherent qualities, and without the advantages of previous military instruction."

Blindness overtakes him again, and he misses a couple of pages, especially the following lines:

"If we could obtain youths with these natural gifts, and build upon them the other qualifications, the ideal would be reached."

All sane men agree on this point; discussion is childish.

He extracts again from the paragraph referring to the transfer of officers from cavalry to infantry, but stops short of the enacting clause, "*Some of the flagrant errors, made in the first assignments can thus be corrected.*"

Comment is unnecessary. The essay was not written for any particular branch of the service. My suggestion, that "For this work the class should be divided into two sections; one section to contain graduates of the Military Academy who have once been declared proficient in law, ordnance and gunnery, drawing, civil and military engineering; the other to contain officers who have had no theoretical instruction in those subjects. It is not possible to put both sections through the same course and do justice to both; either one will be unjustly retarded, or the other unduly advanced," seems to have excited some merriment in the mind of the Major, and he announces that I am a decade behind the times. I disagree with the gentleman, and predict that I am less than a decade ahead of the times. I knew years ago that the classes were divided at one time, and I was of the impression that the division was discontinued for *material* reasons, such as lack of facilities, quarters, instructors, etc. As I remember, the division was made by a sort of mixed examination without reference to previous training: I may be in error. If the Leavenworth course is "with the exception of law and a little engineering, an *extension and amplification* of the West Point course," as the Major claims, the case is bad indeed. If a second lieutenant promoted from the ranks can *justly* be placed in such a course to compete with West Point graduates there is ground for serious reflection as to the utility of maintaining the Academy. It is furthermore an anomaly in education. I am willing to be convinced, but say frankly, that I do not believe it at present, and will retract nothing from the paragraph quoted above. There are exceptions, of course, but a school cannot be successfully conducted on "exceptions."

Our ideas as to abolishing the system of marking students are in unison, and seem to

have originated at about the same time, but they gained priority of publication, which put mine in the place of re-inforcement.

I refer readers to the title of the essay as justification for including so many well-known facts in it. Why he tries to hunt up a quarrel with me for agreeing with him in so many things passes my comprehension. I think the public, at least the public I have heard from, has no misconception either of my ideas or motives. With an *illustration* of a *purely military* method of criticism, I will close a discussion long ago tiresome to all, and of no benefit to the cause or to individuals. It is a pity that an officer who is writing text-books for the army, and who hopes they will circulate abroad, does not take ordinary care to see that they are free from flagrant and ludicrous errors.

In Plate IX. of Wagner's "Security and Information," 1893, upper right hand corner, we see the unusual sight of a contour stopped in its mad career by a night picket. The Major does not give us in the text any decision as to the duty of the picket when confronted by so grave a situation. It has held the contour for some years, and, like the man in the bear story, it does not dare to loose its hold. There is no scale on the map, and we cannot tell how near help is.

Officers about to be examined want a decision *as to what a sentinel at a picket should do with a red contour between retreat and reviville.*

Apparently we all make errors, in maps, and other things. I admit mine cheerfully, with the hope that they will be forgiven at the final settlement. I have no intention of engaging in any discussion with any one upon the various methods and ideas proposed in the essay. Those who want to find some good in it can probably do so, those animated by different motives will be equally fortunate. I have written this with reluctance, and simply because I desire to remove every particle of ground upon which personalities can be built. I thought I had accomplished that feat in the essay, but it seems I was mistaken. There are two good old aphorisms worth remembering. 1st. "People who live in glass houses should keep the panes frosted." 2d. "Courtesy among military men is indispensable to discipline."

II.

"The Lyceum at Fort Agawam."

First Lieut. Wm. E. Birkhimer, 3d Artillery.

WE have read with interest Captain Swift's remarks upon the Lyceum course at this celebrated post, but feel constrained to say that, tested by the facts, as from year to year they are unfolded, his narrative seems to be as clearly in the category of allegorical literature as Bunyan's "Pilgrim's Progress."

After reading the captain's paper, the inference seems fair that he never took part in that Lyceum, and that his knowledge of what took place there was derived from the roseate imaginations of others. We have been stationed for years at Fort Agawam, and can correct some of the errors of fact regarding the manner of conducting the Lyceum there, into which the captain has fallen.

Well do we remember the day when the general order instituting the Lyceum course was received at the post. Expectation was on tiptoe. At last a ready means had been devised for keeping the army professionally abreast of the times. How carefully every paragraph was scanned. The rock of military knowledge was struck, and streams of wisdom were perennially to gush forth.

Every one appreciated the opportunity now afforded him of writing an essay, otherwise styled a "report," of which a full discussion was to be encouraged. What opportunities did this not open; at last a chance was given to get even with the post commander. And right royally was it embraced! Well do we recall the thinly concealed yet point-

edly directed thrust at that ill-fated official, who, in the discharge of his duty, had run counter to the views or vagaries of the "reporting" subordinate. It mattered not that fair minded men deprecated this covert species of attack; the opportunity was given to at once ventilate and redress a grievance under the guise of the performance of official duty, and the most was to be made of it. The path of Christian, as Bunyan describes it, was through Elysium strewn with roses compared with that the post commander now had to tread.

Nevertheless, these attacks looked far-fetched and strained. For some years the commanding officer at Fort Agawam contented himself with simply presiding at the Lyceum. And, to thus attack a man who really had no recognized way of defending himself against assault, felt but yet not seen, to say the least appeared to be in bad taste. At last, however, glorious day for the kicker! the commanding officer of Fort Agawam was informed that he, and not only he but all the field-officers of the line must also write essays or "reports." In vain he pointed out that there would be an incongruity in his writing a paper for his subordinates to discuss. It availed not that he expressed the belief that the only thought the subordinate should give to an official paper written by his commander was implicitly to obey, and never to discuss it. And, as regarded the field-officers, he pointed out that the terms of the order, properly construed, never could have intended that they should make these so-called reports; for, as the latter may be placed before the examining boards when the writer is up for promotion, and as these officers are not subjected to such examination, this language of the Lyceum order would, as to field officers' "reports," be senseless. From all this the faithful veteran commanding at Fort Agawam argued that it never could have been contemplated that either he or his field-officers should make "reports"; but, in pursuance of the customs of several years, and the language of the order that they should officiate only as President and assistant instructors, respectively.

Alas, for the discipline at Fort Agawam, these representations had no effect other than the more surely to confirm the newly discovered interpretation of the Lyceum order. "Reports" from the commanding officer and the field-officers' were the order of the day. Moreover, as their "full discussion was to be encouraged" free rein was at last given to that species of criticism before adverted to. Covered up it was, indeed, under a thin veneering of professed official duty, yet so plainly intended that the most superficial observer could not but discern infallibly the meaning.

The feature of the Lyceum at Fort Agawam which, next to the commanding officer's disciplinary attribute, most conspicuously attracted attention, was the arrangement in the order of sequence of these "reports." The theory upon which the Lyceum superstructure was built was that valuable professional information thereby should be first collected and then disseminated. Naturally, in such a case, the older and more experienced officers would come to the fore; they would be natural leaders in such a cause. How different and disappointing the fact. With a modesty that for once is *not* worthy of all praise, the veterans shrank into the back ground, leaving to their juniors, the mere youngsters of yesterday, and to-day, the duty of the fighting line and supports, while the seniors constituted the reserve far in the rear. Upon the former devolved the brunt of the fight, while, when possible, the latter got out of it altogether.

Such are some of the incidents connected with the Lyceum at Fort Agawam. A well-founded, although perhaps an erroneous impression has grown out of it all, that such institutions, grand and beneficent as may have been their conception, have not in full fruition met the anticipations of their projectors and patrons. In the army, it is believed, no more than elsewhere, does the maxim "put the work on the other fellow" lead to professional excellence.

Reviews and Exchanges.

Cavalry vs. Infantry, and Other Essays.*

THIS volume, edited by Major Wagner, forms the fourth one of the International Series, published by the Hudson-Kimberley Co.

Captain Maude needs no introduction to American officers, and his writings are probably read quite as extensively, relatively considered, in the United States as in England. In a recent preface thanking the editor of *Journal of the U. S. Cavalry Association*, for certain courtesies, Capt. Maude expresses himself in the following kindly words; "I trust my readers will see in this courteous act a fresh evidence of the kindly spirit of comradeship in arms which has always existed, and I hope will ever continue to unite the officers of both armies, and which is so well expressed in Admiral Tatnall's saying, 'Blood is thicker than water.'"

The work consists of the following essays: Cavalry versus Infantry in the Napoleonic Era; Short Service and Discipline; The Napoleonic Conscription; The Old Peninsular Army; The Home Army; The Wars of Frederick the Great; Tactics of Opposing Forces before the First Silesian War; Seydlitz and the Prussian Cavalry; General Marbot's Memoirs; Attack or Defense; The Prussian Cavalry in 1815; General Von der Marwitz's Second Cavalry Pamphlet; The Berlin-Vienna Race; General Von Rosenberg's Hints on Recruit Training and Riding.

If there is one thing that stands out prominently through the work, it is the writer's earnest belief in the axiom, expressed in the opening lines: "The tactics of an army should be based on the racial characteristics of the men who compose it." He does not believe that the same rules are to be applied to all cavalry forces; nor to all infantry forces. The cavalry of some nations may be so excellent as to successfully charge unshaken infantry; and the infantry of some nations may be so firm as to annihilate charging cavalry. But whether the charge be successful or not, cavalry must still *be prepared to charge* unshaken infantry, for, until the experiment is tried, success is uncertain; *Pour faire une omelette, il faut casser des œufs.*

The effect of the Napoleonic wars upon Continental ideas of the cavalry charge, was that cavalry could not charge unshaken infantry. And this, Captain Maude points out, was due to the excellence of the British infantry, and the corresponding inferiority of Napoleon's cavalry who, strange to say, charged only at the trot. But British cavalry *did* charge unshaken infantry successfully, and numerous cases are cited during the Peninsular War, where it occurred. But after Waterloo, where the inferior French cavalry signally failed, French ideas were generally accepted,—even the Germans forgetting how Seydlitz charged unshaken infantry at Roszbach, and defeated it; and likewise at Lörndorf, where he twice turned the scale with his cavalry charges.

In a number of his Essays, Captain Maude attacks the English long service system. He states that with seven years term of service in the British army, the British soldier does not compare in discipline and smartness with the German. During the German term of

**Cavalry vs. Infantry, and Other Essays.* By Captain F. N. Maude, R. E. Hudson-Kimberly Publishing Co., Kansas City, Mo.

less than three years with the colors, wonders are performed. And yet, Captain Maude says, though the German system has produced soldiers capable of fighting their own weight of Frenchmen, they fall short in many ways of the English standard of what soldiers should be. With the relatively greater term of service in the British army, with more intelligent recruits, and with greater individuality among its members, he believes the English army should excel. For he calls attention to the fact that Anglo-Saxon soldiers are the best fighters in the world, and are most efficient when thrown on their own resources; while in Germany the reverse holds good. He states too, that the keystone of German organization is in subdivision of work, and delegation of responsibility, to which we will agree. But his statement that Germans of brains do not, as a rule, reëngage, and that those who are left are afraid of responsibility, must, we think, be accepted with misgivings, unless he means it to apply merely to the private soldiers. However, as compared with Anglo-Saxon soldiers we think the statement well taken. The Germans train the will of the soldier: the Anglo-Saxon trains the mind, and encourages individuality.

Captain Maude states, too, with just a touch of sarcasm, that the Germans teach their men *how to die*; the English teach, *how to avoid dying*. And considering the English character, he points out that the idea of *infliction* of loss, and *not avoidance* of loss, should apply better to English troops than to all others. He criticises too, the fact that some regimental commanders in the British army force their favorite non-commissioned officers upon the captains; while the German captain has absolute independence in the selection, —though often hampered by the lack of intelligence of the material which, within the allotted time, must be hammered into shape for the inspecting officer. He remarks that, if promotion to field-officer in the British army, depended on smartness or efficiency of the company, as judged by a board of officers, and not upon book learning, there would be greater improvement.

In his sketch of the old Peninsular army, he further carries his criticism of the British army of to-day, by the deduction that if the old army, with imperfect organization, inefficient staff, with felons in the ranks and adventurers among the officers, could accomplish such results in spite of discouragements at home, how much more could a modern British army accomplish, if it were trained, as was the old army, to know *how to die*.

Throughout all his essays, touching the present army, Captain Maude deprecates the long service term of enlistment, and the over-centralization of power in the colonel and adjutants, as tending to stereotyped forms and customs, decay of military knowledge, idleness and *ennui* among the officers, and practical divorce from their men. He states that squadron commanders do not, under the present system, learn how to lead their squadrons, and are robbed of incentive to exertion.

His sketch of General Marbot's Memoirs calls attention to one of the most intensely interesting works of modern times. The book is like a novel, and Marbot a veritable Monte Cristo. Besides touching upon the general interest of the work, Captain Maude points out that, according to General Marbot's account, corroborated by others, the statements heretofore made as to the losses and the cold, suffered during the retreat from Moscow, were much exaggerated. He ascribes the whole disaster to lack of discipline more than to any other one thing; and this, in turn, he traces, to the system of centralization of military power, introduced and encouraged by Napoleon himself.

The essay on "Attack and Defense" contains Captain Maude's well known views on the superior efficacy of the attack as compared with the defense. In case of the invasion of England, he favors aggressive attack of the invaders, as giving better opportunity for the use of the individual fighting power of the English soldier; and he moreover believes that the abundant cover and numerous villages add to, rather than detract from, the advantages of the attack.

General Marwitz's pamphlet on "The Prussian Cavalry in 1815," written in justification of Blücher's criticism as to cowardice on the part of the cavalry, contains an interesting discussion of the moral and physical requisites which go to make up efficient cavalry. The moral element, says he, comprise personal courage and *esprit de corps*; the physical, —horsemanship, and soundness and proper condition in horse and rider,—besides mobility and precision in field movements. *Esprit de corps*, General Marwitz says, raises the courage of the individual, through the confidence he feels in his comrades, and the dread of ridicule. The sense of honor and of shame which the whole mass feels when *esprit de corps* exists, is calculated to raise the moral standard of the individuals. The officers are the pillars upon which *esprit de corps* rests, and to perpetuate it the officers must be relatively numerous, and belong for a considerable time to their regiments; for regimental tradition, says he, is almost synonymous with *esprit de corps*.

In concluding the discussion, General Marwitz shows how wanting in both the moral and physical qualities which make good cavalymen was the Prussian cavalry of that day. Although individually courageous and zealous, the men could not ride, and the horses were either untrained or broken down.

The United States cavalry almost invariably take the field at present, equipped with leggings in place of boots. In fact, they derive no small part of their value as both mounted and dismounted troops, to not being impeded with cumbrous boots. And yet General Marwitz, an experienced cavalry officer of the old school, makes a significant statement, which causes thought: "We must also reintroduce the long, stiff jack-boot; for without them, no man could endure the pressure in a charge."

General Marwitz's second pamphlet contains a laughable account of the scolding the Great Frederick gave his cavalry officers, who had evidently become very lax in their duties. Among other things: "Then, when the season for riding drills comes on, the captain sends for the sergeant-major and says: 'I have an appointment this morning at so-and-so, and must get away early; tell the first lieutenant to take the rides.' So the sergeant-major goes to the first lieutenant and gives him the message, and the latter says: 'What! the captain is away? then I am off hunting; tell the second lieutenant to take the men.' And the second lieutenant, who is probably still in his bed, says: 'What! both of them gone? then I will stay where I am; I was up till three this morning at a dance; tell the cornet I am ill, and he must take the ride.' And the cornet says: 'Look here, sergeant-major, what is the good of my standing out here in the cold? You know all about it much better than I do; you go and take the ride.' And so it goes on; and what must be the end of it all? What can I do with such cavalry before the enemy? I tell you, I think so much of the importance of your arm, that I expect more from a lieutenant of cavalry than from a major of infantry. * * *

The account of the Berlin-Vienna long-distance race brings to mind some long-distance riding by our own cavalry. Lieutenant von Reitzenstein, the winner on the German side, completed 388 miles in 73 hours, 6 minutes. This included all stops. The rider was handicapped by poor maps, causing him to lose the way; but was assisted by a bicycle rider who rode ahead and prepared forage. The horse rested only eight hours, and was fed only twice with about 14 lbs. of oats each time, but had oatmeal gruel as often as it could be conveniently given. The horse, a thoroughbred English hunter, a mare ten years old, died the day following the conclusion of the race.

The work is a valuable addition to military literature, and is naturally of especial interest to cavalry officers, whether they agree with all of Captain Maude's views or not. The essays were originally published in the *Civil and Military Gazette*, of Lahore, India, and were thus directly addressed to the Indian army. The duties of the cavalry upon the frontier of India are said to be not dissimilar to those of our own cavalry, so

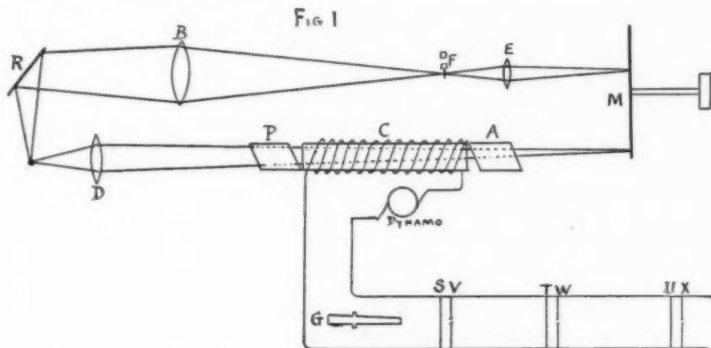
that, in addition to the fact that we have many of the "racial characteristics" of the British soldier, these essays should have a peculiar interest for our cavalry.

CHARLES D. RHODES,
1st Lieutenant, 6th Cavalry.

The Polarizing Photo Chronograph at the U. S. Artillery School.

Descriptions of the above instrument and the experiments made with it are the subjects of articles in the *Journal of the U. S. Artillery* for July 1895, May-June 1896, and Nov.-Dec. 1896, by the inventors, Dr. A. C. Crehore of Dartmouth College, and Dr. George O. Squier, 1st Lieutenant, 3d Artillery, Instructor in the Dept. of Electricity, etc., U. S. Artillery School. The instrument as first used and described was to some extent improvised, the last paper being devoted to a description of the new and complete instrument now at the school.

As a velocimeter the instrument possesses many new and meritorious features, giving a clear, photographic, simultaneous record of minute intervals of time, and a time scale. The principle upon which this photographic time recording rests is that if a beam of light falls upon a sensitive plate rotating on an axis at right angles to its plane, and the beam is interrupted by a shutter at the desired instants, the interruptions in the ring darkened by the action of the light will correspond to these instants; and if by any means there is simultaneously photographed some scale by which time can be measured the intervals between these instants are known.



Heretofore great trouble has been experienced in moving the shutter uniformly, as inertia, even in the lightest shutter, would introduce serious errors when moved with the extreme quickness required. The inventors obviate this by doing away with a mechanical shutter and taking advantage of the following property of polarized light: If a beam of polarized light passes through a tube filled with some transparent medium, as bisulphide of carbon, surrounded by a coil of wire through which a current flows, the plane of polarization will be turned, or its azimuth changed a certain amount, depending upon the strength of the magnetic field produced by the current. If the beam then meets a Nicol prism it will pass through it or be stopped, depending upon the angle through which the prism has been turned upon its axis. If the prism be so turned as to arrest the beam, and the current then interrupted, the resulting change in azimuth of the plane of polarization will allow the light to again pass through the prism and affect the sensitive plate. Instead of moving a shutter, the same effect is produced without having to move any mass. The diagram (Fig. 1) shows the relation of the essential parts.

P and A are respectively the polarizer and analyzer (Nicol prisms). The tube C between them is filled with bisulphide of carbon and wrapped around with the coils. The arc lamp L supplies the light, which is concentrated by lens D, polarized by P passing through C, and arrested by A until the plane of polarization is turned due to current being broken in coil, when it passes through and strikes sensitive rotating plate M. At the same time a mirror R reflects a beam through lens B, through a small hole in a little metal plate attached to the prong of the turning fork F, then through lens E to revolving plate. As the plate revolves the lower beam would, if not arrested, trace a circle on it, while the upper beam from fork would, when fork is vibrating, trace a sinuous circular path, each wave corresponding to one vibration of the fork. Since the number of vibrations per second of the fork can be found with accuracy, its trace on the plate will constitute a time scale. When the current in coil is momentarily interrupted the light passes through A and a record is made at that instant by the light striking the sensitive plate. The current is automatically restored and the next momentary break is similarly registered. The number of waves marked by the fork between the sharply defined beginnings of each record would be the measure of the intervals of time. If these momentary interruptions are made by a projectile from the piece G rupturing the circuit at wire screens S, T, V successively, if we know the distances of the screens apart, the velocity is known. Simple circuit closers V, W, X close the circuit in each case immediately after the screen is ruptured, and before the projectile reaches the next screen.

To prevent the light from remaining turned on and causing a blur of previous indications as plate continued revolving, a "gravity switch" is used, in which contacts are arranged, so that as a weight is dropped it will fire the piece and operate a sliding shutter in which the slot is of just sufficient width to give desired exposure. The plate is rotated at a high and uniform speed by means of an electric motor.

The instrument was used to determine interior velocities in the following way: A 3.2 field-gun is fitted with a wooden collar held on with rings. A metal ring is supported by metallic supports. A wooden rod fitted with copper bands flush with its surface is set in the end of the projectile, and the bands and projectile are connected by an embedded wire. When the piece is fired the rod slips through the ring, and the bands would make and break the circuit through the wires. These intervals of time are recorded on the revolving plate as above described, and give the data for calculating the velocity of the projectile at different points along the bore, without the necessity of mutilating the piece. The minute intervals of time measured in this case show the capability of the instrument. It is said that some of the intervals were less than $\frac{1}{100000}$ of a second. In the complete instrument now installed at Ft. Monroe, described in Nov. and Dec., 1896, number of the *Journal of the U. S. Artillery*, many improvements in the details are noted. A very perfect instrument for measuring the angles with a high degree of accuracy is described.

In summing up the advantages claimed for this chronograph, the following may be mentioned: 1st. Since there is no iron in the coil C, there is no appreciable "magnetic lag." 2d. No pairs of electro-magnets are used whose variation in action from time to time would introduce serious errors. 3d. Measurements are not restricted to a single interval—several successive ones may be taken. Taking it altogether the inventors are to be congratulated upon having devised an instrument which is not only useful in practical ballistics, but also is sure to be an invaluable aid in the measurement of the minute intervals of time now so frequently required in many fields of physical research.

E. R.

The Island of Cuba.*

An authoritative work on this subject at this time should be received with favor and prove interesting, especially to military readers. Much has been written about Cuba, past and present, but it is impossible to find a book which gives as much useful information in a small space, unbiassed by personal preference and partisan feeling, as does the volume now under consideration. The scope of the work is well set forth in the preface: "The writers of the following pages had occasion recently, in connection with the discharge of official duties, to make some investigations relative to Cuba and its relations to the United States. In the arrangement of the work to be undertaken, the previous lines of investigation of the respective collaborators were kept in view, and the book was divided accordingly. The first part contains a detailed description of the physical conditions of the island; the second or historical part, narrates what has been done in this scene of action; the third part describes the present condition of the island from an administrative and commercial standpoint. As the primary object of the authors was to gain correct information and not to dress up a tale of woe or defend a party, they have endeavored to divest themselves of passion and prejudice, and to present the truth as nearly as they could find it.

Part I, descriptive, thoroughly covers all the ground in this respect, from Cape Maisi in the extreme east, to Cape San Antonio in the west. In length we find the island to be about 760 miles, in breadth it varies from 30 to 125 miles, making the area in the neighborhood of 45,000 square miles; about equal to that of the State of Pennsylvania. Politically the island is divided into six provinces, which, commencing at the eastern extremity are, Santiago de Cuba, Puerto Principe, Santa Clara, Matanzas, Habana and Pinar del Rio. In the text these provinces are taken in order and their physical features fully and minutely described. The mountains, water courses, plains, lakes, forests and coasts receive that careful attention which their importance in military operations merit and their interest to the general reader require. The communications are next carefully described. Wagon roads—their location, length and condition; railroads—location, length and companies operating them; steamers, coastwise and foreign, their routes, the companies operating them, and in some cases, the names of the steamers and their sailing days; cable and telegraph lines, and the telephone system of the city of Habana.

Alphabetical list of the cities and towns, their distances from the capital city of the province, their population as well as that of the township. The city of Habana receives particular attention as regards its construction, surroundings and defenses.

All of importance touching the climate and products of the island is fully set forth.

Lieutenant Rowan is the author of the descriptive sketch.

Professor Ramsey takes up the Historical, Political and Commercial divisions of the text.

Under the first heading he gives a very interesting *résumé* of the history of the island from the time of its discovery by Columbus during his first voyage. The effect of the iron and retarding hand of Spain is seen throughout the narrative. A good idea is given of the trocha, about which we hear so much: "There is a line of forts known as the trocha (*i. e.*, trench or traverse) across the island between the provinces of Puerto Principe and Santa Clara. Garrisons were placed in these, and the intervals were occupied by small detachments of troops. General Martinez de Campos had conceived the plan of this line of defense in a moment of inspiration during the previous ten years' war, which he had terminated successfully; and now occupying it again with 100,000 men at his command, he felt

* *The Island of Cuba. A Descriptive and Historical Account of the "Great Antilla."* By Andrew Summers Rowan, First Lieutenant 10th Infantry, U. S. Army, some time member of the Intercontinental Railway Survey, and Marathon Montrose Ramsey, B. S., A. M., Professor of Romance Languages in the Columbia University, Author of "A Text-Book of Modern Spanish." New York: Henry Holt and Company, 1896.

confident of being able to say, 'Hitherto shalt thou come, but no further.' Yet the insurgents under Gomez and Maceo were able to slip through, and return with captured arms and supplies, spreading havoc far and wide, and alarm still more widely. The idea of a trocha to fence out an enemy was still thought to be good in itself, but this one was adjudged to be too remote; so a second was drawn through Las Cruces and Las Lajos, skirting the great salt marsh of Lapata. When that proved equally ineffectual, General Martinez de Campos retreated in the direction of the capital, and constructed a third and shorter military line directly across the island from Matanzas to the bay of La Broa." He took his trocha with him. * * * "Captain General Weyler * * * has established a fourth trocha across the island from Majuna to Mariel, about twenty-five miles west of Habana. As this particular barrier is the one most in interest at present, it may be described more particularly. It consists of a ditch, as the name trocha would indicate, nine feet deep, containing water in the low places. On each bank is a wire fence, and on the east side is a beaten road, which is patrolled by cavalry and light artillery. Along the west bank are detached earthworks, guarded by troops and connected by telephone. The approaches to both sides are protected by rifle pits, about 70 feet apart, and screened by a line of *trouss-de-loup*."

Interesting data in regard to the strength and composition of the Spanish and Cuban forces at present operating on the island are also given.

The political and commercial questions involved receive due consideration, and much important and interesting information can be gained from this part of the text.

The work closes with a bibliography of works on the island of Cuba.

To military men the book is all important.

FRANK H. EDMUNDS,
Captain First Infantry.

Dickman Field Holder.

This "Field Holder," as it is called, consists of a detachable pad of blanks about $5\frac{1}{2}$ by 8 inches, in a stiff oil-cloth holder, cover or case, containing a lead pencil and rubber eraser, this cover has an inside pocket and is held together when closed by an elastic band.

Its purpose is given in the instructions printed on the pocket as follows: "This blank is intended to be of use in a course of instruction of the company or troop in field duties; later, in connection with tactical exercises of the battalion or squadron and of larger mixed bodies; and eventually on actual service in the field in time of peace or war."

The blanks are folded like a sheet of note paper, making four pages; the first, or outside page is ruled in half-inch squares for sketching, nine one way, thirteen the other, this on a scale of six inches to the mile would cover over a mile, but as such a scale would require more details than the time would admit of, probably two or three inches to the mile would be nearer the usual scale; this would permit a sketch of two or three miles.

The fourth page consists of a blank report in about the general form recommended by the text-books on such subjects. The instructions in our books relative to such matters are to be concise, one even going so far as to state on orders: "If there is in an order a single word the omission of which would make no difference to the meaning, the order is too long." Yet here we have an address on the inside and again on the outside.

By folding these two outside pages so as to become the inside, the sketch and report are very conveniently brought face to face; the top and bottom being folded down nearly in thirds, one flap, top or bottom, can be inserted between the two leaves of the other end, leaving the middle fold for the address, a printed form is there for the purpose, with a place for times of departure and arrival, and speed.

In the instructions for the use of the holder the speed for the messengers is recommended to be given by crosses; while this might be better than nothing, as a rule our messengers can read, and memory is not always to be trusted, a written word is far better than a sign. There should be a receipt somewhere for the protection of the messenger; a little thought will bring to mind that some personal history might be different if receipts had been given for reports and orders received in our past wars.

On the whole it is a good effort in the right direction, better suited, however, to the mounted than the foot soldier, and no doubt improvements will suggest themselves upon practical use. J. F.

Special Report on Combined Manœuvres at the Cavalry and Light Artillery School—1896.

This interesting report treats only of the field exercises at Fort Riley, which close the annual curriculum of the School. A glance at the roster shows a decided departure from the conditions of previous years, and also calls to mind the iterated recommendations of the several commandants for changes in the details of organizations for service at the school, that all may in time receive equal benefit from the course of instruction. The departure is in the presence of infantry in the combined manœuvres, the new combination adding largely to the number of possible exercises, while the disparity in the strength of the different arms urges the commandant to suggest that the infantry be increased, during the period of manœuvres, from neighboring posts. The ice has been broken, certainly, by the presence of the Leavenworth troops, so we may hope for greater things in the future. Of the ten light batteries, but three have taken the course since the school began, although recent changes have added two others to this number.

Succession in the detail of the mounted organizations should enter into the plans for the interchange of troops and batteries and the retention of Battery F of the 4th Artillery seems somewhat unnecessary. The want of the complement of officers is noticed, particularly among the Leavenworth organizations. The remedy for this ought to be simple at a post where so many surplus officers are available.

There were, in all, ten exercises, held from October 14 to December 7, in the first six of which there participated twelve troops of cavalry, five companies of infantry and three batteries of light artillery; and the remaining four manœuvres were held by the garrison of Fort Riley alone. The exercises were as follows:

1. Pursuit of a detached force. 2. An attack on a reconnoitring force. 3. Seizure and defense of a bridge. 4. Defense of a railroad against a raid. 5. Attack on an outpost line. 6. Rear guard against advance guard—delay action. 7. Attack and defense of a defile. 8. Defense of river crossings against a reconnoitring force. 9. Use of a cavalry screen. 10. Forced march of concentration.

In preparation for each exercise, a day was allowed commanders for plans and a study of the ground, while following each manœuvre was a fair discussion of the points developed and of the decisions of umpires.

There were several faults which repeated criticism seem to fail in correcting:

(a) Unnecessary exposure of troops, particularly in cases of individual men, whose imaginations seemed unable to create an assumed danger under peace conditions; (b) wild racing of horses over broken ground; (c) retention of caissons in the immediate vicinity of the guns; (d) reckless charges in line on batteries in action; (e) refusal of men to surrender when well inside the rule limits; (f) want of range finders with batteries. Estimates of a certain range varied from 1500 to 2500 yards, the actual distance being 2300. It would seem hardly possible for umpires to decide correctly, at the moment, probable losses from a battery fire under such conditions.

These ten manoeuvres were well worked out, and, except in three cases perhaps, seemed to have been most successful in developing the military principle involved. The reader of this report may note the care and exactness with which the preliminary orders are drawn up to insure the collision of the opposing forces at the right moment and on the ground selected by the director of manoeuvres. The commandant calls attention to the need of field-glasses in the field equipment of officers, and one of the exercises aptly illustrates the danger from their absence. It would be well were they distinctly required by regulations.

The comment of the chief umpire, on page 22, seems somewhat bookish. After admitting the success of a commander's dispositions and ample justification for them, he elaborates a caution against abnormal formations. A commander who can recognize the inaptitude of the normal to the case in hand, and who has the courage to ignore it and the originality to meet successfully unexpected and unusual conditions for which no set of tactical rules can provide, has shown himself an exemplar of military attainments which should be the very aim of these practical field exercises.

Appendix B contains the rules for the government of the exercises. They are very thorough and leave little to be desired. It presents also a very full summary of the powers of the three arms and rules for the guidance of umpires.

H. L. H.

The Travelers' R. R. Guide

(Formerly Appleton's) has introduced a novel arrangement of maps. Instead of the large sheet containing a map of the whole country, which was difficult to examine in the limited space of a railway seat, there are published a series of state maps of the size of the ordinary pages of the Guide, bound in the same manner as the other pages. The maps are corrected down to date and are complete as to details. Maps of the cities of New York, Philadelphia, Washington and Boston are also included. This convenient arrangement, which appears in each monthly issue of the Travelers' R. R. Guide, is an improvement which the public will recognize and appreciate, since nothing is of greater assistance in making up a route and time-table for a tour than a good map.

The Military Service Institution.

President.

Major-General NELSON A. MILES, U. S. Army.

Resident Vice-Presidents.

Major-General THOMAS H. RUGER, U. S. A.

Bvt. Brig.-Gen. T. F. RODENBOUGH, U. S. A.

Secretary.

Capt. JAMES FURNACE, 13th U. S. Infantry.

Treasurer.

Lieut. J. C. BUSH, 5th U. S. Artillery.

Asst. Secretary.

Lieut. H. L. HARRIS, 1st U. S. Artillery.

Vice-Treasurer.

Lieut. F. W. FUGER, 13th U. S. Infantry.

Executive Council.

Term ending 1903.

BRECK, S., Col., Adjt.-Gen'l's Dept., B. G.
(Vacancy.)
EDMUNDS, F. H., Capt. 1st U. S. Infantry
FIEBIGER, G. J., Prof. U. S. Mil. Academy.
HUGHES, R. P., Colonel, Insp.-General.
WOODRUFF, C. A., Major, Sub. Dept.

Term ending 1901.

BAER, T. F., Colonel A. J. A. G.
BREWERTON, H. F., Major U. S. A.
KNIGHT, J. G. D., Major Corps Engineers.
MILLS, S. C., Capt. 12th U. S. Infantry, A. D. C.
MYRICK, J. R., Major 5th U. S. Artillery.
(Vacancy.)

Term ending 1899.

Finance Committee.

Col. BAER.
(Vacancy.)
Major WOODRUFF.

KIMBALL, J. P., Major Med. Dept.
PARKER, JAMES, Capt. 4th U. S. Cavalry.
PATTEN, W. S., Major Q. M. Dept.
PHIPPS, F. H., Major Ordnance Dept.
(Vacancy.)
WEBB, A. S., Bvt. Major-General (late) U. S. A.

Library Committee.

(Vacancy.)

Publication Committee.

General BRECK, Capt. EDMUNDS, and Lieut. BUSH.

Branches.

(In the order of their establishment.)

Vancouver Barracks, Wash.

Vice-President.

Brig.-General E. S. OTIS, U. S. A.

Corresponding Secretary.

Lieut. H. P. McCAIN, 14th U. S. Infantry.

West Point, N. Y.

Vice-President.

Col. O. H. ERNST, Corps of Engineers.

Corresponding Secretary.

Lieut. EDGAR RUSSELL, 5th U. S. Artillery.

Fort Leavenworth, Kansas.

Vice-President.

Col. H. S. HAWKINS, 20th U. S. Infantry.

Corresponding Secretary.

Lieut. R. G. HILL, 20th U. S. Infantry.

Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"An Entrance Fee of Five Dollars (\$5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership and on the first day of each calendar year, thereafter, a sum of not less than Two Dollars (\$2) shall be paid as annual dues. Annual dues commence on January 1st in each year."

NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor. Yearly dues (\$2.00) include Journal.

Changes of address should be reported promptly.



Prize Essay—1897.

I.—The following Resolution of Council is published for the information of all concerned :

Resolved, That a Prize of a Gold Medal, together with \$100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and \$50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary on or before September 1, 1897. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.
3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate the *Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.

In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may commend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1896, for the Prize Essay of 1897, is

"BASED ON PRESENT CONDITIONS AND PAST EXPERIENCES, HOW SHOULD OUR VOLUNTEER ARMIES BE RAISED, ORGANIZED, TRAINED AND MOBILIZED FOR FUTURE WARS."

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1897 are :

GENERAL WESLEY MERRITT,
GOVERNOR U. A. WOODBURY,
COLONEL H. W. CLOSSON.

JAMES FORNANCE,
Secretary.

GOVERNOR'S ISLAND,
Nov. 1, 1896.

B 13 779

